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Producing the House: The Commonwealth Experimental Building Station and Housing Research

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Keywords

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Abstract

Established during the Second World War, the Commonwealth Experimental Building Station (CEBS) researched new building technologies with an emphasis on housing construction. The CEBS experimented with materials and design prototypes in collaboration with both industry and the Council for Scientific and Industrial Research (CSIR), which later became the Commonwealth Scientific and Industrial Research Organisation (CSIRO). Based in North Ryde, Sydney, the CEBS was associated with the Department of Post-War Reconstruction during the Second World War and then moved to the Department of Works and Housing. The paper introduces the CEBS's initial aims through its housing research and design experimentation with built prototypes in Sydney during the 1940s. This research into house design, positioned at the edge of innovation, is situated in the wider housing context of the period. Federally funded building research was predicated by the Commonwealth of Australia's housing shortage during and extending beyond the Second World War. Due to a lack of traditional materials such as bricks and timber from the war effort, the agency trialled developing low-cost, prefabricated concrete and steel houses. These housing experiments are considered in connection to cultural framings of home and its physicality in circulation at the time. After the Second World War, the detached suburban house gained momentum in the political and cultural vernacular as the ideal house for ownership. By examining the CEBS's activities in connection to this background, the paper asks how the nation-state developed mass-production systems to enable government-sponsored agencies to produce more housing for more people but also how understandings of house and home surround and influence innovation in design.

Introduction

1. Patrick Troy, *Accommodating Australians: Commonwealth government involvement in housing*, (Annandale, NSW: Federation Press, 2012), "Commonwealth Experimental Building Station," *Construction* May 1 1946, 4, Accessed Trove: 1 Jul 2021, <http://nla.gov.au/nla.news-article222873392>.

2. Geoff Bock, *The end was to build well: a half-century of Australian government building research* (North Ryde, NSW: CSIRO Australia, Division of Building, Construction and Engineering, 1995), "Success of building tests," *The Sun*, October 27 1947, 8, Accessed Trove: July 1, 2021, from <http://nla.gov.au/nla.news-article2229551070>

3. Hal Pawson, Vivienne Milligan and Judith Yates, *Housing Policy in Australia: A Case for System* (Singapore: Palgrave Macmillan, 2020), 138.

4. Examples: Robin Boyd, *Australia's Home: Its Origins, Builders and Occupiers* (Melbourne, Penguin, 1968); John Archer, *Building a Nation: A History of the Australian House* (Sydney, Angus & Robertson, 1987); Tony Dingle & Seamus O'hanlon, "Modernism versus domesticity: The contest to shape Melbourne's homes, 1945–1960," *Australian Historical Studies*, 27:109, (1997): 33–48, DOI: 10.1080/10314619708596041.

5. See: Antioe Picon, "Construction History: Between Technological and Cultural History," *Construction History* 21 (2005): 5–19. Accessed July 1, 2021. <http://www.jstor.org/stable/41613891>.

6. Sneja Gunew, *Haunted nations: the colonial dimensions of multiculturalism*, (New York: Routledge, 2003).

The Commonwealth Experimental Building Station (CEBS), founded in 1944 by the federal government, was established partly due to the nationwide housing shortage during and extending beyond the Second World War.¹ A decline in traditional residential construction materials such as bricks and timber from the war effort meant that part of the CEBS's program was developing low-cost, prefabricated steel and concrete houses to increase housing output.² The background to the CEBS's implementation and an outline of its early trajectory is introduced to emphasise its work concerning housing. The station's research into building technologies and housing prototypes is situated in the context of cultural understandings of home as tied to the physicality of the house in circulation at the time. After the Second World War, the detached suburban house gained momentum in the political and cultural lexicon as the ideal house for ownership. During the period from the late 1940s into the 1970s, the federal government both produced and financed a large amount of this type of suburban housing stock.³ This paper is a preliminary investigation to draw attention to the existing literature gaps and to discursively investigate whether the intersection between the CEBS's output and the federal government's housing agendas warrants a further, detailed examination. An examination predicated on how architectural science and the design innovation it fosters connects to the government's delivery of housing.

The housing crisis of the 1940s and the setup of the Commonwealth Housing Commission (CHC), which advocated for the creation of the CEBS to help in alleviating the housing shortage, is considered next to the rise of house ownership as a fundamental tenant of Australian citizenship and the debates around the extent the federal government was responsible for this push into a monotenural society. Analysing select CEBS records of the construction experimentations and ventures into house prototypes, often positioned at the edge of innovation, offers an additional dimension to the existing discourse around the design and spatialisation of housing in the postwar period.⁴ Through the CEBS the federal government was intent on developing mass-production systems to enable government-sponsored agencies to produce more housing for more people. However, the CEBS's research also highlights how political and cultural interpretations of house and home surround and influence innovation in design and construction.⁵ By making this connection, this paper raises questions about the nation-state's presence in the domestic sphere and in doing so reveals territory for future research on how marginalised housing histories fit into this context. Housing, both through policy and design, can be connected to how the nation-state aims to manage and arguably produce citizens. In the context of the governing apparatus of the Commonwealth of Australia this is complicated by colonisation and unceded sovereignty by First Nations. Although beyond this short paper's scope, a preoccupation with land ownership through housing in the postwar period signals a modern manifestation of colonial trajectories. Scholars such as Sneja Gunew have argued that colonial apparatuses are palpable in expressions of the Australian nation-state through the management of its populations.⁶

The CEBS was set up on Commonwealth acquired land in North Rye,

7. Early editions: CEBS, *Notes on the science of building: Design for Climate* (Chatswood: Commonwealth Dept. of Works), no. 1, (August 1949); CEBS, *Notes on the science of building: No-Fines Concrete* (Chatswood: Commonwealth Dept. of Works), no. 8, (August 1949).

8. Troy, *Accommodating Australians*, 93-94.

9. Bock, *The end was to build well*, 13.

10. Bock, *The end was to build well*, 14.

11. Troy, *Accommodating Australians*, 94.

12. Examples: David, Victor, Isaacs, *CEBS Bulletin No. 1: The structural sufficiency of domestic buildings*, (Sydney, NSW: Commonwealth Experimental Building Station, 1946); J.W. Drysdale, *CEBS Bulletin No. 3: Climate and house design with reference to Australian conditions*, (Sydney: Commonwealth Experimental Building Station, 1947); Drysdale, *CEBS Bulletin No. 9: Fire Protection in Buildings*, (Sydney, NSW: Commonwealth Experimental Building Station, 1965).

13. Daniel J. Ryan, "Thermal Nationalism: The Climate and House Design Program in Australia (1944-1960)," *ABE Journal* 18, (2021). DOI: <https://doi.org/10.4000/abe.9848>.

14. Examples: Miles Lewis, 'The portable house', in Irving, Robert (ed.), *The history & design of the Australian house* (Melbourne: Oxford University Press, 1985); 274-89; Seamus O'Hanlon (1998) "Modernism and prefabrication in postwar Melbourne," *Journal of Australian Studies*, 22:57, 108-118, (1998), DOI: 10.1080/14443059809387385.

15. T. J. Williamson, "Designing houses for the Australian climate: the early research," *Architectural Science Review*, 56:3, (2013): 197-207. DOI: 10.1080/00038628.2013.807218. Also see: Terence Williamson, "Building and Construction Research" in Philip Goad, Julie Willis, (eds.), *The Encyclopedia of Australian Architecture* (Melbourne, Vic: Cambridge University Press, 2012):164-165.

Sydney on the recommendation from the CHC's (1943-1944) first interim report. Arguably the CEBS's legacy was establishing national building standards but it is probably most known for its technical series, *Notes on the Science of Building*, in publication to 1995, that featured in tertiary education syllabuses.⁷ Initially administered under the Department of Post-War Reconstruction and the Department of War Organisation of Industry, it moved to the Department of Works and Housing after the Second World War.⁸ The Department of Post-War Reconstruction appointed the CEBS's first director, David Victor Issacs, a structural engineer, who during the war had been involved in the production of extremely lightweight aircraft hangers. According to Geoff Bock, by 1945 the CEBS's staff included specialists in "architectural work, civil, electrical, mechanical and structural engineering, quantity surveying and costing together with general office and drawing staff, model makers and a photographer."⁹ The CEBS was initially conceived and practiced with industry cooperation and in collaboration with the Council for Scientific and Industrial Research's (CSIR) Building Materials Research Laboratory, located in Melbourne. These two partnered agencies had distinct operation directives, with the Building Materials Research Laboratory concentrating on material innovation and use whereas the CEBS was responsible for the "design, construction and performance of buildings."¹⁰ By 1986 the CEBS changed into the National Building Technology Research Centre (NBTRC) which had a short lifespan and was abolished in 1987 and resources amalgamated under the Council for Scientific and Industrial Research Organisation (CISRO).¹¹ The CEBS's early research into cost-effective housing construction was documented in publications and internal reports as well as prototyped in built projects located in Canberra, Sydney and Melbourne during the 1940s and 1950s, often in partnership with the State Housing Commissions.¹²

Interrogations of the CEBS's aims and outputs have focused on how its research has impacted the architectural profession both nationally and internationally, namely it's work on thermal performance and prefabrication methods. Daniel Ryan's recent article, "Thermal Nationalism: The Climate and House Design Program in Australia (1944-1960)," offers an alternative approach in that it explores the complications around thermal performance research in the context of post-war nationalism. It examines the CEBS's international reception in an expanding transnational interest in design sensitised to tropical climates.¹³ Although not explicitly about the CEBS, prefabricated housing in settler-colonial Australia has been the subject of extensive scholarship, including the work of Miles Lewis, examining the early architectural trajectories and Seamus O'Hanlon who situates changes in the building industry in the social histories of postwar Melbourne.¹⁴ Scholarship focusing on the CEBS's early research includes the work of T.J. Williamson, notably in his article "Designing houses for the Australia climate: the early research."¹⁵ Centred on the period from 1945-1972, Williamson documents the CEBS's and CSIRO, Division of Building Research (DBR)'s work produced on thermal performance in response to local climates. However, minimal scholarship investigates the CEBS in relation to national or state housing provision or discursively examines the coalescence of technical and design innovation in the context of broader cultural histories that focus on the spatial ideals in circulation about residential architecture.

16. Bock, *The end was to build well*, 10–22.

17. Troy, *Accommodating Australians*, 82–94; Also see Pat Troy and Clem Lloyd, *The Commonwealth Housing Commission and a National Housing Policy: A working draft*, (Canberra: Research School of Social Sciences, Australian National University, 1981); Mike Berry, "Unravelling the "Australian Housing Solution": The Post-War Years," *Housing, Theory and Society*, 16:3, (1999): 106–123, DOI: 10.1080/14036099950149974

18. For overview of CSHA agreements: Troy, *Accommodating Australians*, 95–101; Pawson, Milligan and Yates, *Housing Policy in Australia*, 92–95.

Geoff Bock's, *The End was to Build Well: A Half-Century of Australian Government Building Research* offers an overview of the federal government's formalised building research, chronologically documenting the period from 1944 to 1994.¹⁶ Beginning with the CEBS, and the CSIR Building Materials Research Laboratory, the book focuses on the professional organisation and actors in its administration and research. Relevant to the paper is Patrick Troy's examination of the CEBS's setup related to Post Second World War housing provision in Australia in his book *Accommodating Australians: Commonwealth Government Involvement in Housing*.¹⁷ He discusses successive federal governments involvement in public housing provision in the Commonwealth of Australia. It is focused on housing policy trajectories and the emergence of the Commonwealth-State Housing Agreements (CSHA) in 1945, and how they impact the provision of accommodation—its design types and the influences these types had on town planning.¹⁸

House Ownership: The Rise of a Domestic Ideal

19. Alastair Greig, *The stuff dreams are made of: housing provision in Australia 1945–1960*, (Carlton, VIC: Melbourne University Press, 1995); Ruth Balint and Julie Kalman, "The idea of home in postwar Australia," *History Australia*, 11:1, (2014): 6–12, DOI: 10.1080/14490854.2013.11668497

20. Sarah Ferber, Chris Healy and Chris McAuliffe, (eds.) *Beasts of Suburbia*, (Carlton, Vic: Melbourne University Press, 1994); Graeme Davison, Tony Dingle and Seamus O'Hanlon (eds), *The cream brick frontier: histories of Australian suburbia* (Clayton, Vic.: Monash Publications in History, Dept. of History, Monash University, 1995. Chris Butler, "Reading the Production of Suburbia in Post-War Australia," *Law Text Culture* 11 (2005), 11–33.

21. Graeme Davison, "Australia: The First Suburban Nation?" *Journal of Urban History*, 22, 1, (1995): 40–74. DOI:10.1177/009614429502200103

22. Hugh Stretton, 'Housing and Government,' Boyer Lectures, (Sydney: Australian Broadcasting Commission), 1974; Contemporary analysis see: Andrew Gorman-Murray, "Contesting Domestic Ideals: queering the Australian home," *Australian Geographer*, 38:2, (2007): 195–213, DOI: 10.1080/00049180701392766.

23. Hal Pawson, Vivienne Milligan and Judith Yates, *Housing Policy in Australia: A Case for System* (Singapore: Palgrave Macmillan, 2020), 138.

24. Pawson, Milligan, Yates, *Housing Policy in Australia*, 138.

After the Second World War, the detached suburban house built with climate sensitivities gained popularity as an ideal housing type for Australian citizens and its imagery becomes inscribed in the national imagination.¹⁹ In a range of design-orientated publications aligned to the architectural industries and the wider public, this housing type becomes synonymous with ideas about the 'Australian House' and by extension, the physical incarnations of home. Suburbia and its predominant housing type emerge as the location for the 'Australian Dream' of house ownership as connected to ideas of home and emplacement.²⁰ Graeme Davison, in his notable article, "Australia: The first Suburban Nation?" discusses the suburban boom in Australian cities in the 1950s and 1960s and the emergence of a property-owning democracy that was spatialised through the suburbs.²¹ Introducing this housing type and its emergent hold over the Australian population as an aspirational ideal offers a platform to reflect on settler-colonial housing histories. Namely, the political apparatuses that influence the generation and inscription of house ideals and how they endorse select physical framings of home, frequently linked to conceptions of the nuclear family in circulation.²² An analysis of the federal government's strategic role in the rise of owner-occupied housing helps to understand its aims and agendas into sponsoring research to optimise house production.

Hal Pawson, Vivienne Milligan and Judith Yates have argued that Australia has had a relatively high owner-occupier housing rate since the early 1900s, but the growth period was after the Second World War "from 50% in 1947 to a peak of around 70% in 1961."²³ This rapid growth was one of the highest in the industrialised world and they argue that the "aggregate homeownership remained relatively stable at this level until the mid-1980s but has trended down slightly since then."²⁴ Associating this growth with social modernisation and the expansion of urbanisation and its counterpart suburbanisation, they also argue that the growth is due to direct government involvement in the provision and financing of housing. They argue: "In Australia, Commonwealth and State governments contributed almost one quarter of the total increase in housing stock between 1947 and 1976. They also provided

25. Pawson, Milligan, Yates, *Housing Policy in Australia*, 138.

26. Troy, *Accommodating Australians*, 4. For an overview of the Commonwealth Housing Policy see: Ross A. Williams, "Housing Policy in Australia, Research paper, University of Melbourne. Department of Economics, no. 113," (Parkville, VIC: University of Melbourne, Dept. of Economics, 1984).

27. See: Greig, *The stuff dreams are made of*, 97-122.:

28. Greig discuss a range of voices relevant to historical period: Colin Hay, "Housing Policy in transition: From the Post war Settlement Towards a 'Thatcherite' Hegemony," *Capital and Class*, no.46, (Spring, 1992); Charles Pickett, "Modernity and Austerity: The 1950s Home", in J O'Callaghan (ed.) *The Australian dream: Design in the Fifties*, (Sydney: Powerhouse, 1993); Greg Whitehall, *Making the Market: The rise of Consumer society*, (Melbourne: McPhee Gribble), 1989.

29. Jim Kenedy, *The myth of home-ownership: private versus public choices in housing tenure*, (London; Boston: Routledge & Kegan Paul, 1981), 113.

30. Greig, *The stuff dreams are made of*, 117-118.

31. Greig, *The stuff dreams are made of*, 118. For home-builder's see: Tony Dingle, "Self-help Housing and Co-operation in Post-war Australia," *Housing Studies*, 14:3, (2010): 341-354, DOI: 10.1080/02673039982830.

32. Kenedy, *The myth of home-ownership*, 125.

up to 30% of all housing finance."²⁵ In relation to the Commonwealth emphasis on owner-occupier led housing policy, Patrick Troy argues that in Australia, "homeownership is the story of the majority who have been beneficiaries of Commonwealth policy and initiatives directed to those who own their one home or have been encouraged to become homeowners. It is an account of the extent to which housing policy has been constructed to deliver and entrench benefits for the better off."²⁶ However, the role of the nation-state in the expansion of owner-occupied housing, specifically the level of its orchestration and interference has been heavily debated.²⁷

Alastair Greig in the chapter, "The Growth of Owner Occupation" in his book *The Stuff Dreams Are Made Of: Housing Provision in Australia*, offers a summary of the literature examining what prompts this development after the Second World War. Perspectives discussed vary from functionalist, Marxist approaches to centring the effect of rent control to considering the psychological and material influence of post-war modern affluence both as glossy imagery and reality.²⁸ This includes contesting Jim Kenedy's position that the nation-state combined with concurrent capitalistic interests is instrumental in the growth of owner-occupier house tenure. Kenedy argues that in the Australian context this is achieved through directives including "legislative facilitation of home-ownership, the provision of financial benefits for homeowners and the direct funding of building home-ownership."²⁹ Greig argues that the nation-state "at most, performed a 'facilitative' rather than 'generative' role in fostering high levels of owner-occupation and that the metaphor of an 'accelerator' is more important than that of a 'trigger'."³⁰ Instead Greig posits that in the 1950s: "A whole range of social and economic forces coalesced during the decade to push Australia towards a more monotenural society." These forces included the rise of the DIY house builder due to scarcity of labour and materials from the war, as well as the proliferation of architectural Modernism and its influence on house design, interior fashions and household commodities.³¹

Teasing out the scale of involvement the federal government had in the adoption of house ownership as a societal ideal and aspirational aim is beyond the scope of this paper and from this brief analysis of published literature on the subject, it is contested territory. However, it is apparent that Commonwealth and State government policy aimed to encourage certain housing tenure types and the promotion of a monotenural system with owner-occupied at the centre, "maximises class differences in housing and creates rigidities which act to constrain variety and diversity in housing."³² The Commonwealth's directives to address the housing crisis emerging in the final years of the Second World War, including design orientated research needs to be studied in the context of the growth of owner-occupied housing in Australia.

The Housing Crisis of the late 1940s and the Commonwealth Housing Commission

A future housing crisis, including shortages and the diminishing quality of Australia's housing stock, emerges as a federal government concern during the Second World War. Shaped in part from the downturn of the building industry during the war, housing gathers momentum as

33. Rae Duffy-Jones, "A historical geography of housing crisis in Australia," *Australian Geographer*, 49:1, (2018): 5-23, DOI: 10.1080/00049182.2017.133696; For post-war reconstruction see: Stuart Macintyre, *Australia's Boldest Experiment: War and Reconstruction in the 1940s*, (Sydney: New South Publishing, 2015).

34. Duffy-Jones, "A historical geography of housing crisis in Australia," 13.

35. *Commonwealth Housing Commission, Final report*, 25th August 1944, (Sydney: Ministry of Post-war Reconstruction, 1944), 23-25.

36. Duffy-Jones, "A historical geography of housing crisis in Australia," 6

37. CHC, *Final report*, 25th August 1944.

38. Troy, *Accommodating Australians*, 47-66.

39. *Commonwealth Housing Commission; Second interim report*, 31st March, 1944, (Canberra : L.F. Johnston, Commonwealth Government Printer, 1944).

40. Drysdale, *Report on Overseas Visits, Special Report no.2* (Sydney: Commonwealth Experimental Building Station, 1948).

41. Bock, *The end was to build well*, 31-33.

42. Aust. Parliament. Cabinet Agendum No.5659b, Appendix 1, Experimental Building Station, November 1943 in Bock, *The end was to build well*, 21.

a national issue and becomes central to post war reconstruction.³³ Rae Duffy-Jones in her article "A historical geography of housing crisis in Australia," outlines the spatial dimensions to post world war reconstruction as connected to both the problematisation of housing and its provision. She argues that "the post-war expectation that governments should intervene in social and economic processes to optimise the freedom and opportunities of individual citizens led to a reworking of the relationship between housing and governance."³⁴ Through the establishment of Inter Departmental Committee and then the subsequent CHC, housing is given prominence in the nation's reconstruction after the war and the CHC's final report, Part IV, charts the need for the federal government to participate in housing, partly as a continuance of wartime controls.³⁵ Duffy-Jones argues that the government's intervention in housing leads to "problematizing people and places in ways that shape the character of subsequent solutions."³⁶ She suggests that housing was flagged as a solution to additional, more tangential government problems, namely social and regional problems. This spatialisation of immediate postwar housing policy prompts a drilling down on the spatial, material and physical attributes of the housing examples, asking how the promotion of select housing types effects urban planning. However, more significantly, if the federal government frames housing with the additional task of being a methodology for social reform, how does the design of dwelling types prescribe and inform implicit social conventions.

In April 1943, the CHC was established with two primary aims to present the current housing position and to inquire and report on the future housing requirements during the post-war period.³⁷ Troy has argued the setup of CHC and its findings was one of Australia's most significant welfare policy initiatives, namely for its legacy in public housing provision.³⁸ However, the CHC is introduced here as it pertains to the setup of CEBS. A formalised research organisation to foster technical innovation to help with the housing crisis was one of the CHC's recommended strategies in its interim report of March 1944.³⁹ Prior to the CEBS's establishment, both the NSW Chapter of the Royal Australian Institute of Architects (RAIA) and Institution of Engineers Australia (IEA) lobbied to the director-general of the Ministry of Post War Reconstruction for the Commonwealth to inquire into building innovation. A driving aim was to kickstart the building industry through research into alternative construction methods and early initiatives included overseas scoping studies as well as consultation with Britain's Watford Building Station.⁴⁰ In addition, four sample models of British prefabricated, single standing houses arrived in Sydney in 1946, futuristically branded, Airoh, Tarran, Acron and Uni-Seco. Each showcased a material approach— respectively, aluminum, concrete, steel and Uni-Seco was timber framed and covered inside and outside with asbestos cement sheeting.⁴¹ Outlined in a Cabinet Agendum of 1943, cost reduction was the station's main game and it informed other listed priorities including the reduction of ceiling heights and simplifications of plumbing and wiring.⁴² Under the heading 'Special Design Problems,' the emphasis on housing is signaled with priorities including the design of a low-cost house suitable for tropical climates, development of prefabrication mechanical equipment unit for low-cost houses and developing concrete houses.

Precast Concrete and Steel: The CEBS'S Housing Research

43. Example: C.P. Sorensen, *Curtain Walls*, Technical Study No.41, February 1959 (Sydney: Commonwealth Experimental Building Station, 1959).

44. Examples: Drysdale, *Climate and house design: a review of investigations of the thermal behaviour of buildings*, Duplicated document, no. 30. January to August 1949, (Sydney: Commonwealth Experimental Building Station, 1949); *Earth wall Construction*, Duplicated document, No. 28, June 1949 (Sydney: Commonwealth Experimental Building Station, 1949).

45. Internal reports, held at NLA: Report No. 7/2, "Report on the Rose Systems of House Construction," September, 1947; Report No. 364/1: "Report of Tests on Precast Concrete Masonry Units Manufactured by W.J Sloper," August 1974, (Sydney: Commonwealth Experimental Building Station).

46. Report No.1-2. "Report on the Steel Framing on Stewarts and Lloyds System as Used in Home erected at Granville, Sydney, NSW by the HSW Housing Commission and Messrs. Stewarts and Lloyd's (Australia) Pty, Ltd," January 1945; D. Popplewell, Report No.16-1, "Report on a Precast Concrete-Slab House erected at Pagewood NSW," January 1945, (Sydney: Commonwealth Experimental Building Station).

47. Report No.1-2. "Report on the Steel Framing on Stewarts and Lloyds System as Used in Home erected at Granville, Sydney, NSW."

48. Bill Balodis, "CISRO Forest Biosciences 2008 Seminar Series, "The Chronicles of the Forest Products Laboratory, 1918-2008."

Although established with a housing agenda, the CEBS scope of inquiry was considerably broad; for example it investigated optimising curtain wall construction in the 1950s.⁴³ The CEBS produced extensive documentation classified under bulletins, documents and technical studies and it is too early in the research to make a conclusive judgement about how pivotal the detached house was as a driver in this research.⁴⁴ In addition, these publications tend to describe the research's technical attributes intently and offer minimal contextual information about the reasoning behind the research or the directions of enquiry taken. Archives of both the CEBS and the Department of Housing and Works will hopefully uncover the administrative aims undergirding the innovation. However, the agendas informing the setup as outlined and selective surveys of unpublished reports show an invested interest in increasing and improving house construction through alternative materials and methods, that would work alongside tradition building approaches, with house prototypes centred on the nuclear family plan.⁴⁵

Two early built prototypes include a house with steel framing in Granville, Sydney, reported on in 1945 and a precast concrete-slab house in Pagewood, Sydney, constructed in 1944.⁴⁶ The Housing Commission of NSW with the CEBS built the experimental house with steel tubular framing in conjunction with the English wrought iron and steel giants, Stewarts and Lloyd, who had operated in Sydney since 1882. The report concludes with the apparent obstacle that in producing a suburban type, steel framing is unlikely to be competitive with timber in a wider housing market due to cost of the steelwork.⁴⁷ In this report, there are only construction details and a textual outline of the house's layout and the discussion appears to be grounded on an established design model rather than a reciprocal approach between program and construction. Alternatively, the report documenting the precast concrete-wall house prototype concluded that there were obvious advantages over the traditional use of brick. The report includes a plan and extensive photographic documentation of the construction process with the experimental elements contained to the walls and the flat hoods over porches. The plan is of a detached house with a verandah connected to an outside laundry, two bedrooms, living room and dining room adjacent to an open kitchen—an economical version of the detached house, planned for a nuclear family unit. Extensive photographs document the construction showcasing early systems of trial and error. The CEBS also experimented with plywood house prototypes, raising questions about whether this research drew on early 20th Century investigations in factory-produced houses in the USA by Forest Products Laboratory or from product innovation from its Australian office based in Melbourne.⁴⁸ As this research progresses, drilling down on the use and innovation of materials such as plywood or concrete provides a platform to think about how the material languages of construction impress utility next to value and how values associated with specific materials get adopted and reworked across a range of spatial scenarios.

Conclusion: The Nation-State in the Domestic Sphere

49. Troy, *Accommodating Australians*, 93-94.

The housing crisis in the late 1940s and 1950s propelled an unprecedented interest by the federal government in housing that resulted in the setup of the CHC and formalised research into housing design and construction. The CEBS's history was marked by administrative debates around its purpose and was pushed and pulled under the strategic aims of successive federal governments.⁴⁹ However, an analysis of its early output exposes how the nation-state influences and interferes in the production of residential design. From this preliminary study, the federal government intended developing mass-production systems to enable government-sponsored agencies to increase housing production. The CEBS was in part a research tactic for the government to investigate whether it had the capability, the means and the will to work hand in hand with industry to develop a state-sponsored building industry. Raising questions about how the CEBS's findings were adopted and used by industry but also how its relationship with the British equivalent, the Watford Building Station, and the transnational companies it partnered with highlights framings of the Commonwealth of Australia's nationhood during this period. In addition to the primary aims to increase the provision of affordable housing, the CEBS's early research priorities highlight the federal government's favoured types of housing tenure and offer a platform to consider how the nation-state inscribes citizenship through housing.

50. For federal government involvement in housing First Nations: Peter Read, (ed.) *Settlement: a history of Australian indigenous housing*, (Canberra: Aboriginal Studies Press, 2000). For Commonwealth on-arrival accommodation for migrants and refugees, see: Ann-Mari Jordens, *On Accommodating Migrants*, (Canberra: Australian National University), 1994; Sara Wills, "Between the hostel and the detention centre: possible trajectories of migrant pain and shame in Australia," in William Logan & Keir Reeves, (eds.), *Places of Pain and Shame: Dealing with Difficult Heritage*, (New York: Routledge, 2009), 263-280.

By introducing the CEBS's research trajectory next to the escalation of the detached suburban house as the ideal form for house ownership in Australia, this paper has generated initial questions that warrant further examination. Through the lens of architecture, it asks how government-sponsored housing spatialises and visualises housing ideologies? In addition, how do these housing ideologies consider marginalised persons under the nation-state's governing apparatuses and what is their agency within these frameworks? For example, the federal government's assimilatory agendas were encoded in Commonwealth housing provisions for First Nations as well as in the Reception and Training Centres provided for Displaced Persons on-arrival to Australia as part of Post Second World migration programs.⁵⁰ Through detailed archival work, the research hopes to explore the manifestation of the nation-state in domestic architecture by asking what both the CEBS and the Department of Works and Housing records indicate about housing provision preferences and how funded innovation fits into these historical narratives. In particular, how the relentlessly persistent trope of house ownership as a method of family or individual securitisation became so ingrained in the national vernacular at the cost of substantial investigation into other forms of collective dwellings.