



# 8

## Facilitating the Sustainable Housing Transition

### 8.1 Introduction

The evidence makes it clear that the way we are currently providing housing is not sustainable from a range of perspectives. As discussed in the early chapters of this book, current housing provision has a significant impact on the environment, and we need to facilitate a sustainable housing transition if we are to achieve wider emission reduction targets. However, such a transition is not just about reducing the environmental impacts of the housing sector, but also enhancing social and financial outcomes for individual households and our wider society. In those earlier chapters, we discussed the challenges and opportunities we currently face to facilitate this sustainable housing transition. Given these challenges, and the complexities across a range of socio-political-industrial elements, the middle chapters explore the idea of sustainability transitions as an opportunity to address these challenges and help with the accelerated provision of sustainable housing at scale, in both the new housing and existing housing spaces. The previous two chapters explored how this was being addressed in real world examples and case studies across ten different socio-technical dimensions and across key themes identified in earlier chapters of the book.

In this chapter, we draw upon the preceding chapters to discuss the implications of the evidence and current context for facilitating the sustainable housing transition. We do this across three core sections. In Sect. 8.2, we discuss the importance of drawing upon sustainability transitions theory to inform the sustainable housing transitions. This includes reflections on how we need to extend the theory to align with the unique challenges of the housing sector. Following this, Sect. 8.3 focuses on the sustainable housing transition, including where we are placed in that transition, potential pathways forward, and challenges that still need to be addressed. In Sect. 8.4, we reflect on the types of innovations required across policy, practice, and research to help facilitate the sustainable housing transition. We then build upon this in Chap. 9 by discussing the prospects for a sustainable housing transition and revisiting the core ideas woven throughout the book.

## 8.2 Sustainable Housing Transitions: Beyond a Niche

Within broader discussions of urban sustainability transitions, housing has long been identified as a niche [1–4]. In part, this has emerged from an understanding that a transition to a low carbon housing future will require more than just a technical solution, and in fact, will require deep structural changes to the way housing is provided and used [5–8]. However, analysis of housing as a niche has been problematic. Housing design, technology, location, quality, performance, and affordability have significant implications for households' health and well-being, liveability, costs, financial gain, and access to jobs, services, and recreation [9–29]. Housing intersects across different housing typologies and characteristics (e.g., new and existing housing), scales, time, and sectors. The idea of a 'niche' as it is typically applied within transitions research does not capture this kind of complexity.

Much of sustainable housing transitions research comes back to the early work of Smith [1, 30]. Smith explored the development of sustainable housing niches and defined the current regime through a

socio-technical (or sustainability) transitions framework. This research made an important contribution towards developing an understanding of the contrasting socio-technical dimensions of, and current pressures between, niche actors and the regime. Much has changed in the sustainable housing space since Smith's work, not only in terms of technological innovation but also in relation to improved understandings of the social implications of housing. In addition, sustainability transitions research has evolved with several new areas of focus being put forward to improve understandings and implementation of transitions [31]. We argue it is time to re-visit how we look at housing within sustainability transitions and reflect on how we might approach housing transitions research differently given recent theory and sustainable housing developments.

To do this, we focus on socio-technical dimensions, rather than the niche-regime dynamics of housing. Socio-technical systems are multi-actor processes that consist of multiple elements, such as practices, policies, or technologies. In Chap. 6 we presented 10 socio-technical dimensions for sustainable housing transitions: (1) guiding principles, (2) physical attributes, (3) knowledge, (4) geography, (5) industrial structures and organizations, (6) policy, regulations, and governance, (7) markets, users, and power, (8) everyday life and practices, (9) culture, civil society, and social movements, and (10) ethical aspects. Each dimension begins with a definition followed by an overview of how the current housing regime engages with the dimension and how sustainable housing offers a different approach, ending with a short example of how this is being provided or considered in practice. In Chap. 7, we explored how these socio-technical dimensions intersect across different housing typologies and characteristics, scales, time, and sectors. We organized this around six themes: high performing housing, small housing, shared housing, neighbourhood scale housing, circular housing, and innovative financing for housing. Each theme begins with an overview and is followed by a series of case studies. The aim is to demonstrate ideas from the book in real world projects.

When we evaluate sustainable housing through these socio-technical dimensions, it is clear that there have been some significant changes within the sustainable housing space. For example, in relation to industrial structure and organizations, sustainable housing has shifted from

bespoke single buildings with a cost premium to scaling up the delivery of multiple buildings and even whole precincts with little, if any, cost premiums. In addition, new research directions highlight the need to consider ethical aspects within current governance approaches to the sustainable housing transition. Focusing on socio-technical dimensions demonstrates that sustainable housing delivery is not only occurring within the traditional housing industry but with input across other sectors such as energy networks (e.g., with renewable energy generation and battery storage) and transportation (e.g., public transport and electric vehicles). There is also a ‘messiness’ occurring with different speeds of progress (e.g., new vs existing housing). The outcome is that housing is not well suited to being considered as a niche from a traditional transitions perspective. Without a rethink of housing, the sustainable housing transition cannot truly challenge these deeper structural changes within the current housing regime.

### 8.3 Facilitating the Transition

If we use wider climate change target goals of achieving near zero emissions outcomes by 2050 as a starting point for change in the housing sector, we have less than three decades to transition to the type of sustainable housing we are advocating for in this book. While this may seem like quite a long time, the reality is that it is not long at all. Looking at policy development around the world, we see that in places like the EU and California it took at least 10 years from the announcement to implementation of zero (or near zero) energy/carbon new housing [32, 33]. These approaches included various step changes<sup>1</sup> at intermittent periods to have a controlled improvement to minimum performance requirements. If other jurisdictions were to take action today, it is likely that we would not see all new housing achieve the standard required for a low carbon future until at least 2035. And that would assume that policies could be

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<sup>1</sup> We define step changes in policy as where there is a longer term policy goal set e.g., 10 years, with smaller ‘step change’ policy identified at various points across the specified time period to help shift the policy and outcomes from where they currently are to the longer term goal.

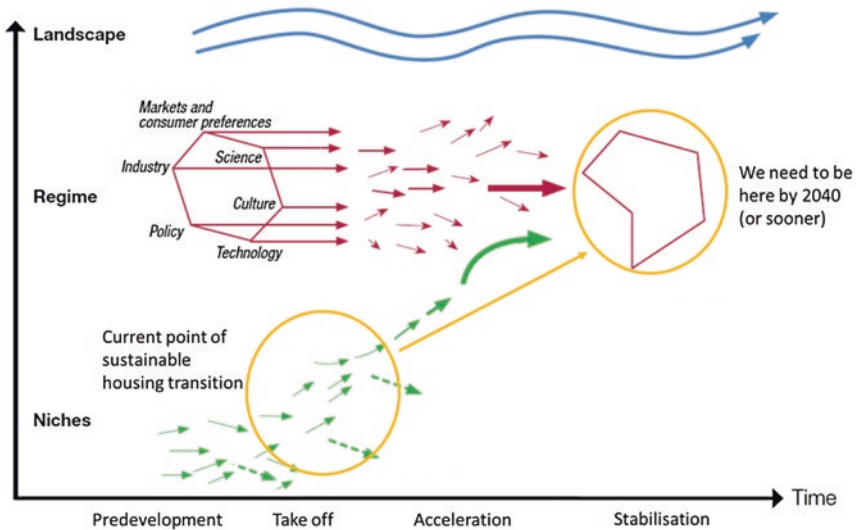
developed and approved quickly, but as this book has explored, nothing is ever easy when it comes to implementing or improving minimum building performance requirements. We must also recognize that not all countries even have minimum performance requirements which means it may take them longer to first introduce and then improve standards to the level required. Looking at other jurisdictions, it has taken 30–50 years to go from the introduction of some minimum performance or sustainability standards to the point they may be close to delivering the types of housing required [34–36]. We simply do not have the time now to wait for other jurisdictions to take the same type of pathway.

In recent years, we have seen sustainable housing policy attention broaden from new housing to existing housing. In some jurisdictions, there has been the introduction of minimum performance requirements for existing housing. This is typically being applied at the point of sale or lease of a property, where the dwelling must ensure it meets a minimum standard. While a good step forward for ensuring improved performance of existing housing, there are some limitations to this approach. For instance, there is often a ceiling for how much money the dwelling owner must spend on improving performance (which could potentially mean not lifting performance sufficiently to meet new standards if retrofit activities hit the finance cap first), and it is only dwellings on the market for rent or purchase that are being captured (missing most existing housing). Additionally, the requirements for improving quality and performance are generally about incremental improvements, and there is a significant gap between that and what we are advocating for in this book. The existing housing sector is likely several years behind the new housing sector in terms of achieving or requiring quality and performance outcomes for new housing. The challenge remains that it can be more difficult to improve the quality and performance of existing housing due to existing dwelling characteristics and constraints, and not all dwellings will be able to cost-efficiently achieve the types of performance outcomes that new housing can (or will at the very least require different approaches such as the use of more technology).

Clearly there is a disconnect between the current provision of housing and where we need to be for a low carbon future [4, 35, 37]. There is also a significant gap between leading jurisdictions and their requirements for

new and existing housing, and what is being provided in the housing sector in other jurisdictions. This highlights the need for different approaches in different jurisdictions.

If we go back to the sustainability transitions phases presented in Chap. 5, the sustainable housing transition is still in the pre-development phase (see Fig. 8.1). There is limited visible change at the systems level, but substantial experimentation and development are occurring at the niche level with pressure for change starting to build on the current regime in some jurisdictions. Perhaps, in some jurisdictions with more advanced minimum performance regulations, it could be argued that they are entering the take-off phase where enough pressure is being exerted on the existing regime and the niche challenger is beginning to destabilize the regime and increase its own diffusion. However, the evidence presented in this book suggests that most jurisdictions are firmly in the pre-development phase of this sustainable housing transition.



**Fig. 8.1** The MLP and interactions between the three nested hierarchical levels with our reflection of where we are in the sustainable housing transition and where we need to transition to

The question is, how do we facilitate the sustainable housing transition to move from that pre-development phase through to take-off, and then into the acceleration and finally stabilization phases?

It would be nice to think consumers and the wider housing sector will naturally start to demand and provide sustainable housing at the levels required, within the timeframe required. However, we have limited confidence that this will be the case given the complexities of housing markets and the way they have been structured. What will be required is a proactive push and pull approach where various policy levers and industry innovations are used to significantly improve the quality and performance of housing and support deep structural changes to the housing industry. This will require a clear pathway that maps out the changes needed over the coming years and decades. To ensure a well-considered approach, any pathway should be developed working backwards from longer term goals and timeframes (e.g., sustainable housing by 2050) and forwards from where we currently are. For example, in Australia more than 8 million dwellings will need to be retrofitted by 2050 meaning that 35 dwellings per hour need to be retrofitted. However, capacity to start delivering this outcome is not available—it needs to be scaled up first. Developing a plan around this scaling up is not just about the number of houses or labour required, but also about supporting supply chains and other industries that are involved.

Based on the evidence of housing regulation development, and the urgency of change required, all jurisdictions should be introducing sustainable housing requirements in accordance with the material in this book by no later than 2030. For this to be successful, jurisdictions need policy pathway plans to determine how to get from where they are now to the targeted 2030 outcome as soon as possible. This will provide transparency and give confidence to the housing industry, other stakeholders, and housing consumers, as well as provide time for the industry to adapt. The policy pathway can also act as a framework for those in the housing industry who want to innovate and go beyond minimum requirements. This will help create a market advantage, drive innovation of design and construction, and work to reduce any costs from the required changes. For those jurisdictions further advanced with their minimum housing

quality and performance requirements, they could be aiming to achieve these outcomes even sooner.

The existing housing sector is more complicated than new housing due to reasons discussed earlier in this book. However, the ambition should be to see the majority of existing housing achieve sustainable housing performance outcomes of at least 80% of those of new housing in terms of improving performance through various approaches such as improving insulation and glazing, and updating to energy and water efficient appliances and including renewable energy technologies. This is what wider research says is possible and should be the minimum target for existing housing [38–44]. Many stakeholders have argued we should first focus on improving new housing outcomes to get them right before addressing existing housing, but there is more potential to rapidly improve the sustainability outcomes of housing from the existing housing sector. Therefore, we should be ambitious with pathways for addressing existing housing performance. By 2025, there should be a requirement for mandatory disclosure of building quality and performance at point of sale or lease that includes cost effective opportunities for upgrade and retrofit. To ensure confidence, this information must be robust, reliable, and transparent.

With this mandatory disclosure information in place, jurisdictions should look to introduce minimum performance requirements that are triggered when a dwelling is sold or rented. Using examples from Europe, this approach would first look to capture the worst performing housing (e.g., F and G on the A–G scale) and improve them to a higher standard (e.g., to a minimum of E), targeting the most cost-efficient retrofit opportunities. Following this, there should be a clear plan to improve minimum requirements to higher performance levels across a defined time period so that there is a clear pathway for change. If the above is in place by 2025, it would not be unreasonable to expect that minimum performance requirements could be improved from E in 2025 to D in 2028, C in 2031, and B in 2034 (allowing for 3 years in between minimum performance changes). From 2035 onwards, requirements for existing housing at point of sale or lease could be aligned with new housing requirements. Although, some flexibility would be required to accommodate that not all existing housing will be able to achieve the same



outcomes in the same ways, and may require alternative solutions (e.g., if there is no capacity for onsite renewable energy generation, it may need to be located offsite). That would mean there is 15 years from 2035–2050 to retrofit all existing housing to the level required for a low carbon future. Some jurisdictions are starting at a higher level for quality and performance of existing housing and should be able to mobilize and scale up deep retrofit earlier, potentially achieving sustainable housing outcomes for all existing housing by 2040 (or sooner). This more ambitious timeline will help inform and guide other jurisdictions that are further back on their sustainable housing transition, and should not be used as a reason for those laggards to delay improvements, as each jurisdiction must take individual action as part of the global collective.

The above is naturally a broad plan and each jurisdiction would need to develop a specific plan based upon local context, capacity, and skills. However, given that the issue of mitigating climate change is a global challenge, we should look for at least some level of coordination for the sustainable housing transition. This means that there should be global pathways that set expected practices, with some flexibility for jurisdictions to adapt as required. Any pathways must include sufficient policy, industry, and consumer support, and take place at different levels. Globally, there is a need for a coordinated approach, and this must start by bringing together jurisdictions to work through a process to develop and implement a shared global plan, similar to the Conference of the Parties conference events. Every jurisdiction should develop short, medium, and long term goals for improving housing quality and performance, goals that should be linked to wider climate change and other societal targets.

Setting longer term policy is a critical step towards the sustainable housing transition [36]. However, this will only be successful if there is sufficient support in place to allow the transition to occur. This support needs to include education for the existing regime and housing consumers, and potentially financial support to help offset any additional costs from improved performance requirements. If financial support is to be provided (e.g., through rebates for sustainable materials or technologies), these should be a clear phase-out plan so there is an incentive for stakeholders to innovate and drive down costs. There are also challenges

around the globe with a lack of labour and supply chain issues. These will also need to be addressed to ensure that we can scale up the sustainable housing transition without delays or choke points in the system. Governments should also provide support for further research and development of retrofit solutions that can be delivered at scale and across different housing types. This could open opportunities for retrofits to be delivered to a greater number of dwellings more quickly, more efficiently, and at a lower cost, rather than addressing retrofits one dwelling at a time.

Improving performance of new or existing housing at the individual dwelling level is important, but it is not the only focus in the sustainable housing transition. To fully unlock the potential of the sustainable housing transition, we need to have housing stakeholders engage with stakeholders in other related sectors such as energy and transport. The energy network in many countries has been developed as a centralized system whereby energy is generated at fossil fuel generation plants and transported large distances to the places where energy is used. The move away from fossil fuel energy, and the balance between the scaling up of dwelling and larger scale renewable energy generation, should provide the opportunity for innovations in the energy network to help facilitate the sustainable housing transition. For example, decentralized energy networks could help share renewable energy between neighbouring houses. The role of electric vehicles and the development of two-way batteries in these vehicles also open up different opportunities for energy management at a dwelling level.

While this book has largely been focussed on developed countries, a global sustainable housing transition must include developing countries. The housing challenges in developing countries are often different to those in developed countries, and we must ensure that the sustainable housing transition in developing countries can help address some of those wider housing and social challenges in those locations. Much like with the global climate change approach, we will need developed countries to help support developing countries with the sustainable housing transition. This can be through sharing of knowledge, skills, materials, technologies, and research, but also likely through financial support to help such countries change their housing industries.

## 8.4 A Time for Reflection

In the previous section, we outlined pathways to facilitate the sustainable housing transition for new and existing housing. This was largely a pragmatic exercise working through a visualization and back casting process to map out a pathway for how we can achieve a sustainable housing transition by 2050. This process was focussed on regulatory and policy changes to drive the transition as this has been found to be the most successful way for improving minimum quality and performance outcomes across the housing sector. As such, the pathway takes an overarching view of the transition and assumes that more nuanced changes at various levels under the policies (e.g., changes to construction practices) will also be included.

Furthermore, there is no discussion in the above pathway around the type of housing we are providing or if it is sufficient for our housing needs today and into the future (not just from a quality and performance perspective, but in terms of the characteristics of our housing). There is a need to challenge wider considerations of housing to ensure we are not just bolting on sustainability to existing ideas of what housing is. Instead, we need to take this opportunity to reconceptualize housing and housing needs. In many housing markets, consumers have been provided with housing based on what the housing sector has deemed consumers want. We need to ask if this is really what consumers want, and we need to provide them with information about their choices and encourage them to explore alternative options. The opportunity to reconceptualize housing should be done within the wider social, financial, and environmental challenges seen across the housing sector.

For example, affordable housing issues are increasingly prevalent in many jurisdictions [45–47]. Exploring opportunities to address sustainable housing could also help address affordability issues [4, 48, 49]. Some of the case studies we presented in Chap. 7 highlight how this can occur. Co-housing and Nightingale Housing are two alternative ways to provide housing where elements of a traditional house are shared, helping to reduce environmental impact and construction costs. To provide this type of housing at a larger scale, it is not just about changes in the design

and construction process but will also require households to let go of their perceptions of what should be included within a dwelling. Changing social understandings of housing and housing needs will be necessary if we are to successfully facilitate a sustainable housing transition.

We also need to encourage a range of stakeholders to think in a more visionary way to unlock different ways to reconceptualize housing and help create different options across the housing sector. It is interesting to look at TV shows or movies set in the future and see how they are providing housing. Are there lessons we can learn from those imagined futures to help us with our sustainable housing transition?

It is not just imagined futures that can help us reconceptualize housing. Climate scientists are telling us with increasing certainty what the changes to the climate will be into the not-so-distant future. We need to use this information to inform the provision of climate resilient housing moving forward. There are multiple elements to this, including that we need to use climate projections to inform the design of our new housing and retrofit of our existing housing. As we noted in earlier chapters, the evidence is already showing that the performance of housing is changing with the climate. We must use climate data from at least the midpoint of the assumed life of a dwelling to ensure that the performance is suitable for that climatic future.

We also need to use this information to ensure we stop building in locations that are at higher risk of climatic events in the future. This will mean that areas we have already built in, or are expanding into, may not be suitable for communities to live in as our climate changes. Increasing fire, flood, and other climatic events in recent years have exposed poor planning of housing, and there is already an impact on households, the wider community, and governments. For example, in Australia in 2022, repeated floods in a region of New South Wales led the state government to announce a buyback programme for up to 2000 dwellings as the risk of exposure and damage to further flood events was deemed too significant [50]. There are going to be increasing examples of this around the world where whole communities may have to be relocated due to climate change impacts. Who will pay for this, and how will decisions be made about who is moved (and to where), and who is

excluded from any move? These are questions most policy makers and society have not had to ask, but it is important we start asking now.

Additionally, we need to ensure that the sustainable housing transition does not just occur for those who can afford to participate, but that everyone is included. The evidence finds that vulnerable households face a range of financial, social, health, and well-being impacts from the housing they live in, and that they are often living in poor quality and performing housing [48]. It is critical that there is a focus on how to ensure vulnerable housing cohorts are included, if not prioritized, in this sustainable housing transition. This will likely require different approaches and collaborations to help vulnerable households compared to what approaches might work for the wider housing community. To help facilitate this, there needs to be a shift in considering housing from an upfront capital cost to the through-life impact of housing on households (and the wider environment and society). For example, including health and well-being benefits in the considerations of policy changes will ensure that improved value is not just about the financial bottom line, but about wider impacts [51].

Throughout this book, we have acknowledged that we are in a climate emergency and, as such, need to urgently address the quality and performance of housing. Time is of the essence in relation to wider environmental impact, but also increasingly due to the rising cost of living and other emerging social impacts related to our current housing. In Sect. 8.3, we mapped out what we believe to be a realistic but pressing pathway that will require significantly quicker progress for many jurisdictions. However, while the sustainable housing transition is time sensitive, we must ensure we do not create unintended consequences by moving too quickly. In this regard, our pathway above sets out short-medium term policy actions to ensure a scaling up of the provision of sustainable housing, and to give clear guidance to the wider housing industry and consumers about what will change and when the change will occur. This will help ensure everyone is working towards the change.

A challenge with scaling up sustainable housing quickly will be ensuring that such housing is actually provided and that shortcuts are not taken. This will require rigorous checks and balances throughout the design and construction (or retrofit) process to give consumers

confidence that what they are paying for is what is provided. The disconnect between design intent and actual performance is already an issue in many jurisdictions and must be addressed moving forward [35]. This will mean a higher number of random checks by independent experts throughout the construction process, as well as stronger legal protection for households. In many countries, there is a lack of opportunity for consumers to seek redress for housing that fails to meet expected standards of quality and performance.

Innovation will also be important to help facilitate the sustainable housing transition. Technology innovation has been a significant area of focus within the wider housing sector over recent decades, but there is a need for more innovation across all phases of a dwelling from the design through to end of life. This innovation is not just for physical attributes like materials and technologies, but also the processes involved for providing housing. Throughout earlier chapters, we have noted a number of innovations being attempted in the planning system that are trying to find ways to improve the provision of sustainable housing, such as through encouraging higher density housing in suitable locations. However, there are opportunities for other innovations or the expansion of existing mechanisms and approaches, which could help address some of the challenges we discuss in this book. For example, upfront cost and a lack of hands-on experience have been raised by some in the residential construction industry as holding back the provision of sustainable housing.

Inclusionary zoning is a planning mechanism that requires a certain percentage of housing provided in a development to be set aside for affordable housing. This approach is used in some jurisdictions and it helps to provide more housing that is affordable to those who typically could not afford such housing. A similar approach is being used to require developments to be built to a significantly higher standard compared to regulated minimums through green building re-zoning processes. Increasing the use of these types of policies would help to give those in the housing construction industry incentive and experience building to a higher standard (helping to negate the lack of experience challenge) and would help provide more sustainable houses (helping to address cost challenges).

We need to find ways to bring together a range of different stakeholders and expertise to think about innovations that could help facilitate the sustainable housing transition. It will be by working together than we can ensure this transition is as effective and efficient as possible.

## 8.5 Conclusion

The evidence presented in this book makes it clear we need a sustainable housing transition. Earlier chapters presented sustainability transitions theory as a useful framework for helping to understand and facilitate such a transition. However, as we explored in this chapter, the sustainable housing transition will require us to extend this theory and our understanding of how to apply the theory in practice. In extending the theory, there are a number of practical outcomes that will be required to facilitate the transition. For example, we must come up with global and local plans for how this sustainable housing transition can occur. Having a global approach will allow a collective and shared response to the issue of housing quality and performance and ensure that efficiencies are maximized through global supply chains. With varied local housing contexts and different starting points, each jurisdiction will need to adapt this global plan to ensure we can efficiently and effectively deliver upon the sustainable housing transition. As we discuss in this chapter, we must also take the opportunity to ask key questions of our housing and housing needs.

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