

## 13 Pathways to sustainability

### Co-optimizing economic development, the environment, and employment and earning capacity

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#### 13.1 Transformation challenges for the industrial state

In addressing pathways to sustainability that co-optimize *competitiveness, employment, and the environment*, it is clear that more than an economic recovery is needed to respond to the underlying problems of the 2008 financial crises, the causes of which began much earlier (Varoufakis 2011).

In this work, we argue that what is needed instead of economic recovery is a *transformation of the industrial state*. The problem with language and words, like the terms competitiveness and recovery, is that they carry with them assumptions that hide a multitude of ideas and socio-economic behaviors that may no longer be true.

Because the term “competitiveness” is so often used in policy discussions, it is important to be clear that the term should not be restricted to profit, increases in GDP, or market share – derived from the usual neoclassical economic and private-sector-dominated metrics – but rather must also include societal measures of both aggregate and distributional measures of economic and social welfare, including purchasing power. See especially Aiginger et al. (2013), who argues for a more comprehensive definition of competitiveness.

An economic recovery implies returning to the economic and social system that predated collapse or crisis, but with additional checks, balances, and stopgap measures that can prevent a return to chaos. In a sense, in the United States this approach was represented by the New Deal to correct the economic excesses of the Depression and in Europe by the Marshall Plan to rebuild war-torn economies. While we recognize the value of approaching sustainable development from the grassroots/bottom up, having studied the evidence presented throughout this work, we are convinced of the need to utilize top-down interventions to change the structures that guide investment and development. In fact, such changes – outlined in Tables 13.1 to 13.4 and discussed in Sections 13.3 and 13.4 – may enable grassroot initiatives to flourish by expanding the scope of their impact/influence.

The utilitarian *assumption* that a profitable economic system that maximizes collective or total wealth can be best for everyone through distribution and redistribution is manifestly not true. The work on inequality of wealth and income by Piketty (2014), Atkinson

(2015), Stiglitz (2015), Kallis (2011), Bivens (2017), and Alperovitz et al. (2015) paints a clear picture of the growing wealth and income gaps, despite people working just as hard or harder and longer today than in the past to make a living. The belief expressed by the European Commission in its Lisbon Strategy and its successor, the Europe 2020 strategy – intended to create “smart, sustainable and inclusive growth” that results in the most competitive, environmentally sound, and job-creating economic system in the world – is now regarded as both unrealistic and unachievable (Ashford and Renda 2016).

Questions have been raised as to whether capitalism and equality are compatible (Atkinson 2015; Piketty 2014; Stiglitz 2016), whether capitalism requires endless growth (Saunders 2016), whether exponential growth is still possible (Ayres 2006), whether a sustainable environment can be achieved in a market economy (Sanders 2006), whether “going green” will suffice to achieve sustainability (Borel-Saladin and Turok 2013; Hoffmann 2011; Lorek and Spangenberg 2013), whether instituting community and societal ownership can replace both capitalism and socialism (Alperovitz et al. 2015), whether individual earning capacity can be significantly increased through expanding opportunities for individual ownership of productive capital (R. Ashford et al. 2012), whether a deliberate policy of degrowth is needed and can be achieved (D’Alisa et al. 2014; Kallis 2011), and indeed whether macroeconomics is so basically flawed that it needs to be abandoned (Keen 2016; 2017; Stiglitz 2016).

Two issues that have enormous and immediate policy implications are the relative contributions of technological displacement (Brynjolfsson and McAfee 2014) and trade (Bivens 2017; Autor et al. 2017) to unemployment and wages. These different perspectives have been discussed and the views of their protagonists (promoters) and antagonists (detractors) noted and analyzed in this work (see Section 1.2.3 in Chapter 1, Sections 3.3.1 and 3.5.2 in Chapter 3, and Section 5.2.1 in Chapter 5 for a discussion of technological displacement; see Section 5.2.5 in Chapter 5 for the effects of globalization and trade on employment and wages).

What emerges here is not definitive answers to the questions that have been raised but rather the identification of an extensive range of deliberate strategies at multiple levels that could, if carefully integrated, lay the foundation for a transformation of the industrial state. Leaving the needed transformation to the markets by themselves is unlikely to manifest in meaningful change towards a more sustainable – and fair – society.

In the final chapter of the original 2011 edition of this work, we generated detailed recommendations for going forward. In revised form, these are represented in the tables found in Section 13.2. However, changes have been made in three significant ways: (1) there is more of a focus on global climate change and energy; (2) the last 6–7 years have provided evidence that not only are sustainability challenges worsening – in achieving equitable economic welfare, meaningful and well-paid employment, and earning capacity, and the needed environmental and climate change improvements – but policies are wrong-headed and more drastic medicine is needed; and (3) world conflict is worsening, creating economic, political, and environmental migrants in the context of failing national and international governance.

Fortunately, we are now aided by the work and thinking of some renowned scholars of sustainability who have entered into the debate. Joseph Stiglitz (2015) has addressed these questions head-on in his *Rewriting the Rules of the American Economy: An Agenda for Shared Prosperity*. See also Alperovitz et al.’s (2015) *The Next System Project: New Political Possibilities for the 21st Century*; John C. Dernbach’s law review article “Creating the Law of Environmentally Sustainable Economic Development”; and the report from the Economic Policy Institute by Bivens (2017) entitled *Adding Insult to Injury: How Bad Policy Decisions Have Amplified Globalization’s Costs for American Workers*.

In preparing a revised version of the 2011 work, we decided to retain the ambitious objective of crafting a comprehensive framework that tries to tie together theories across

multiple disciplines – from economic development, innovation, and employment, to environmental, occupational, and public health and safety regulation, to trade and international multilateral environmental agreements. While it can be challenging to bring such a range of subjects together, this integration is critical to ensuring that strategies intended to advance economic development and environmental protection, for example, do not undermine employment (or income) or run afoul of international agreements. Scholars have argued that our inability to integrate solutions is the major barrier to sustainable development (Dernbach 2011). We hope this work and this chapter in particular make important steps towards connecting the critical dimensions that need to be considered when transforming how we live and work on this planet.

The approach taken by Stiglitz (2015) in *Rewriting the Rules* focuses on correcting the economic system with specific recommendations for serious changes to the economic system with regards to transparency; the treatment of income and salaries, profit, private and public investment, intellectual property rights, and credit; the financial sector; labor markets; health care; social security; capital transfers; and penalties for wrong-doing (see Box 13.1). Although these recommendations go a long way in correcting major concerns, Stiglitz does not directly address the environment or the democratization of ownership, and appears to assume, rather than discuss, whether capitalism is compatible with democracy or equality.

**Box 13.1 Stiglitz, J. (2013) *rewriting the rules* (excerpts from the executive summary, pp. 8–9)**

**Taming the top**

*Fix the financial sector*

- End “too big to fail” by imposing additional capital surcharges on systemically risky financial institutions and breaking up firms that cannot produce credible living wills.
- Better regulate the shadow banking sector.
- Bring greater transparency to all financial markets by requiring all alternative asset managers to publicly disclose holdings, returns, and fee structures.
- Reduce credit and debit card fees through improved regulation of card providers and enhanced competition.
- Enforce existing rules with stricter penalties for companies and corporate officials that break the law.
- Reform Federal Reserve governance to reduce conflicts of interest and institute more open and accountable elections.

*Incentivize long-term business growth*

- Restructure CEO pay by closing the performance-pay tax loophole and increasing transparency on the size of compensation packages relative to performance and median worker pay and on the dilution as a result of grants of stock options.
- Enact a financial transaction tax to reduce short-term trading and encourage more productive long-term investment.
- Empower long-term stakeholders through the tax code, the use of so-called “loyalty shares,” and greater accountability for managers of retirement funds.

***Make markets competitive***

- Restore balance to intellectual property rights to encourage innovation and entrepreneurship.
- Restore balance to global trade agreements by ensuring investor protections are not prioritized above protections on the environment and labor, and increasing transparency in the negotiation process.
- Provide health care cost controls by allowing government bargaining.
- Expand a variant of chapter 11 bankruptcy to homeowners and student borrowers.

***Rebalance the tax and transfer system***

- Raise the top marginal rate by converting all reductions to tax credits and limiting the use of credits.
- Raise taxes on capital gains and dividends.
- Encourage U.S. investment by taxing corporations on global income.
- Tax undesirable behavior such as short-term trading or polluting and eliminate corporate welfare and other tax expenditures that foster inefficiency and inequality.

**Growing the middle*****Make full employment the goal***

- Reform monetary policy to give higher priority to full employment.
- Reinvigorate public investment to lay the foundation for long-term economic performance and job growth, including by investing in large-scale infrastructure renovation: a 10-year campaign to make the U.S. a world leader in innovation, manufacturing, and jobs.
- Invest in large-scale infrastructure renovation with a 10-year campaign to make the U.S. a world infrastructure innovation, manufacturing, and jobs leader.
- Expand public transportation to promote equal access to jobs and opportunity.

***Empower workers***

- Strengthen the right to bargain by easing legal barriers to unionization, imposing stricter penalties on illegal anti-union intimidation tactics, and amending laws to reflect the changing workplace.
- Have government set the standards by attaching strong pro-worker stipulations to its contracts and development subsidies.
- Increase funding for enforcement and raise penalties for violating labor standards.
- Raise the nationwide minimum wage and increase the salary threshold for overtime pay.

***Expand access to labor markets and opportunities for advancement***

- Reform the criminal justice system to reduce incarceration rates and related financial burdens for the poor.

- Reform immigration law to provide a pathway to citizenship for undocumented workers.
- Legislate universal paid sick and family leave.
- Subsidize child care to benefit children and improve women's workforce participation.
- Promote pay equity and eliminate legal obstacles that prevent employees from sharing salary information.
- Protect women's access to reproductive health services.

***Expand economic security and opportunity***

- Invest in young children through child benefits, early education, and universal pre-K.
- Increase access to higher education by reforming tuition financing, restoring protections to student loans, and adopting universal income-based repayment.
- Make health care affordable and universal by opening Medicare to all.
- Expand access to banking services through a postal savings bank.
- Create a public option for the supply of mortgages.
- Expand Social Security with a supplemental public investment program modeled on private Individual Retirement Accounts, and raise the payroll cap to increase revenue.

In contrast, Spangenberg (2007), Bivens (2017), Bivens and Blair (2016), and Dernbach (2011) address the options to correct the growing inequality, employment challenges, and environmental problems of the capitalist state.

Alperovitz et al. (2015), Kelly (2012), and Jackson and Victor (2013) concern themselves with enhancing community and societal ownership, while Robert Ashford (2015) focuses on increasing individual ownership through expanding access to capital ownership through the future earnings of capital. Jackson and Victor (2013) emphasize the critical need to transition to a shorter workweek, as do Ashford and Kallis (2013). Such a transition may be more acceptable and likely when combined with R. Ashford's vision of expanding access to capital ownership.

Finally, the financial crisis also created an opportunity to seriously question the viability of the *growth* agenda, fueling the *degrowth* movement that continues to advance a broad range of ideas and paradigms (D'Alisa et al. 2014; Kallis 2011).

As the title of this work indicates, our work focuses primarily on the urgent need for industrialized economies to transform the way goods and services are provided to their people (Ashford and Hall 2011a). While poverty, environmental and disease devastation, and abuses of human rights are major challenges that need attention in the developing world, we believe that technology, financing, and political leadership for sustainable development may first need to find their expression in the developed world before being adapted to the developing world. Put differently, the industrialized nations need to get their own house in order and explore and experiment with different models for development that might then be emulated or modified in emerging regions. Ultimately, developing countries will need appropriate technical, institutional, and financial assistance to make the changes that are needed so desperately, but such changes must place them on a sustainable development trajectory.

Sustainable development decries a simplistic definition and rather is a multidimensional concept characterizing development that seeks to:

- meet human needs and avoid adverse effects of industrialization within and among nations and on subsequent generations;
- provide an adequate and fair distribution of essential goods and services;
- provide for good health, safety, and an environment without environmental injustices;
- provide for fair working conditions and ensure occupational health and safety;
- provide for fair, stable, and meaningful employment and earning capacity;
- meet and expand the potential for a nation's self-reliance, capacity for innovation, and participation in the global economy; and
- engage individuals in society to realize their human potential (that is, social inclusion).

In the next section of this chapter, we present in four tables a number of policies and approaches that industry, governments, non-government organizations, and stakeholders can take to advance the above development agenda. These policies and approaches – which pull together the ideas/recommendations discussed throughout this work – emphasize the need for technological, organizational, institutional, and social innovation that can disrupt existing forms of industrial development, ideally replacing them with inherently sustainable models of production and service delivery.

In this regard, our work is grounded firmly within the Schumpeterian notion of creative destruction, whereby innovation (or new ideas) replace existing and perhaps open up new markets in the process. What we urgently need are systems that provide incentives for disruptive change that results in inherently sustainable goods and services. While we have spoken extensively about the failure or limitations of environmental, economic, and employment policies and regulations, we should also reflect on the failure of our educational systems to provide students, practitioners, and scholars with new ways of thinking about and envisioning the future. Specifically, the dominance of neoclassical economic thinking is perhaps one of the most pervasive challenges facing sustainable development. The interventions listed in the tables reflect the assumption that accepted economic theory and growth are likely to remain central components and features of national development agendas. What we have attempted to do is reveal to students, practitioners, and scholars how they can refashion existing approaches and develop new laws, policies, and strategies to create a transformational framework. To do this, we needed to explore our existing systems in some detail to highlight where changes are needed. Thus, this work is written for individuals who are or will be working within the systems we already have in place, and who are driven to change these systems. While it is tempting to focus on new visions of the future, we believe these will simply remain an illusion if those who have the ability to shape our governance systems do not have the tools or knowledge to do so.

What should be evident from this work is that we believe an *evolutionary* rate of change – where innovation is more sustaining than disrupting in its nature (Christensen 1997) – is likely to be insufficient to make major inroads into the development challenge ahead.\* What is needed is *revolutionary* change – of both a technical and strategic nature and a political and social nature. At Rio+20, the international community missed a critical opportunity to establish an agenda of radical change/innovation to promote sustainable development. In Section 13.3, we explore approaches that could help address the likelihood of slower, or even negative growth, or increases in inequality, and negative influences on employment, wages, and earning capacity – as a consequence of limits to growth or by design (through degrowth).

\* See Sections 6.2.2 in Chapter 6 and 7.6.5 in Chapter 7 for a discussion of evolutionary versus revolutionary change.

While the green economy could lead to more sustainable forms of development, the lack of any universally agreed-upon green-economy targets to guide progress means that nations may have no option but to adopt a business as usual approach to development, especially given the current global financial crisis and concern for jobs. Rather than viewing mechanisms to promote sustainable development as an economic burden (or job destroyer), governments could adopt an agenda that welcomes creative destruction and deliberately targets the destruction of old approaches and conventional ways of developing.

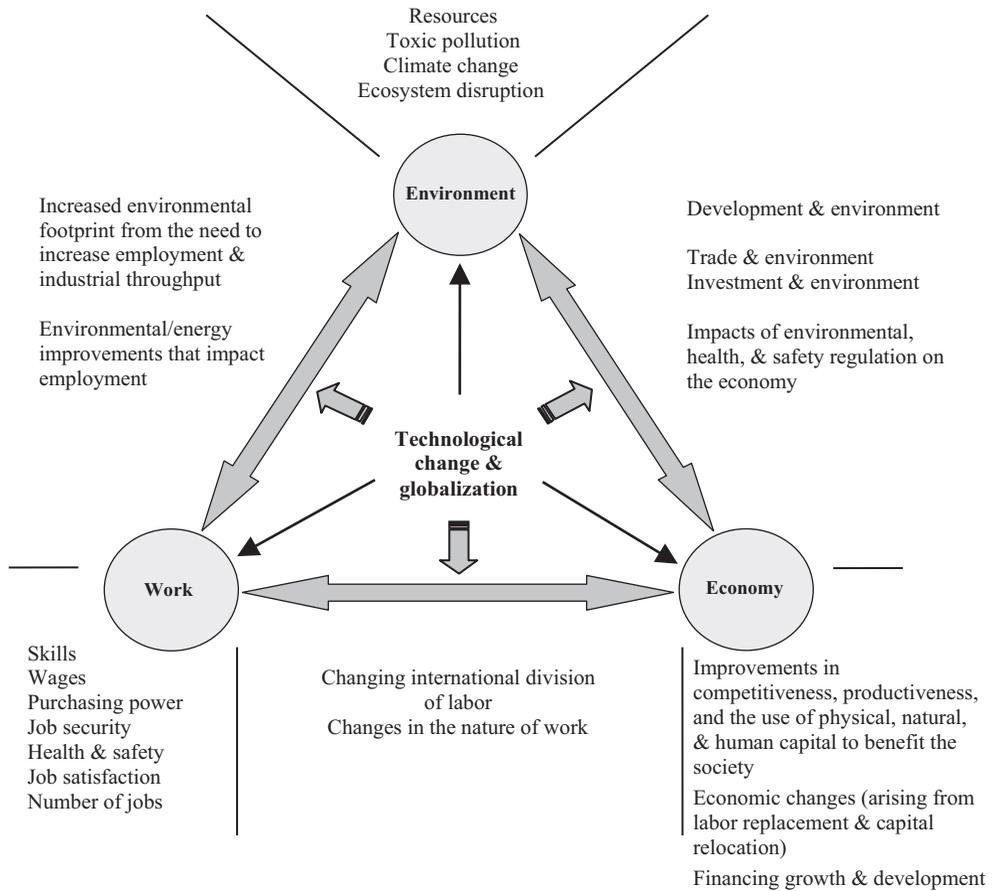
With regards to guiding progress towards sustainable development, the 2015 Paris Agreement on climate change and the 2015 Sustainable Development Goals (SDGs) do provide a unifying set of commitments that can shape development (see Section 2.4.4 in Chapter 2). While the Paris Agreement commitments are voluntary, the requirement to report progress every five years keeps attention on those commitments. In contrast, the SDGs and the emerging network of supporting targets and indicators have the potential to broaden the scope of developing efforts so that multiple goals can be addressed at once (Hall et al. 2017). Thus, expanding the “problem space” to include a broader range of issues – such as environmental concerns, worker health and safety, meaningful and rewarding employment, and economic welfare – also expands the scope of innovation and the dimensions of the “design space.” The design space refers to the dimensions along which the designers of technical/social systems concern themselves. Expanding the available sociotechnical design space includes simultaneous consideration of the determinants of competitiveness/economic welfare, the environment, and employment. The interconnectedness of SDGs provides governments, industry, NGOs, and international institutions with an opportunity expand their problem and design spaces in an effort to promote more sustainable solutions – i.e., solutions that address multiple interconnected goals.

Further, technological innovation and trade drive national economies in different ways (Charles and Lehner 1998). The former exploits a nation’s innovative potential, the latter its excess production capacity. A sector or national economy that increases its competitiveness through innovation-based performance does present some opportunities for skill enhancement and higher-paying jobs, whereas pursuing competitiveness through cost-reduction strategies focuses on leaner production (with worker displacement), flexible labor markets, and knowledge increasingly embodied in hardware and software rather than in human capital.

The innovation-based performance strategy rewards and encourages skill acquisition for some, with appropriate financial benefits for those workers. In contrast, a cost-reduction strategy creates a division between workers: some are necessarily upskilled, but the skill content of many is reduced. This contrast in the effects on employment may no longer hold (see the discussion in Section 13.3 and the work of Autor and Acemoglu in Sections 3.3.1 and 3.5.2 in Chapter 3). Different national strategies might be pursued in either case, reflecting different domestic preferences and cultures, but there are further implications, depending on the extent to which trade drives the economy.

### 13.2 Selected interventions from the perspective of the developed nation–state

Given the powerful role of technology and globalization as drivers of change, **we argue that the operationally important dimensions of sustainability consist of competitiveness (equitable economic development and welfare), the environment, and employment and earning capacity** (Figure 13.1). These three dimensions together drive sustainable development along different pathways and go to different places than environmentally driven concerns alone, which may otherwise require trade-offs, for example, between environmental improvements and jobs.



*Figure 13.1* Technological change and globalization as drivers of change within and between three operationally important dimensions of sustainability

From the above perspective on sustainable development, we have developed a series of specific national and international governance initiatives that, if adopted, could promote progress towards sustainability. These initiatives advocate the need to:

- Promote more sustainable industrial production and consumption (Table 13.1);
- Improve health, safety, and the environment (Table 13.2);
- Enhance meaningful, rewarding, and safer employment and adequate earning capacity (Table 13.3); and
- Promote more sustainable industrial trade (Table 13.4).

For each of the four strategic areas listed above, the recommendations are grouped in one of five categories – industry initiatives, government intervention and regulation, education and human resource development, stakeholder involvement, or the international community. We believe the initiatives captured in Tables 13.1 to 13.4 provide a useful set of ideas for advancing many of the SDGs.

Table 13.1 Strategies to promote more sustainable industrial production and consumption

Industry initiatives	Government intervention and regulation	Education and human resource development	Stakeholder involvement	International community
<ul style="list-style-type: none"> <li>• Use more natural capital.</li> <li>• Dematerialize products and processes.</li> <li>• Devote more attention to durable goods and remanufacturing.</li> <li>• Shift to cleaner and inherently safer technology, products, processes, product–services, and services.</li> <li>• Use less energy in production and in the provision of products and services that themselves require less energy in their operation and use.</li> <li>• Shift from selling products to selling product–services wherever possible.</li> <li>• Hire scientists, environmental and public health professionals, engineers, material scientists, and energy specialists to design and work together to devise energy-saving, cleaner, and inherently safer product–services, processes, and services.</li> <li>• Transform, if possible, or replace incumbent industry with innovative and sustainable producers and providers of services.</li> </ul>	<ul style="list-style-type: none"> <li>• Provide the physical infrastructure (for example, high-speed rail, ports, and telecommunications) and legal infrastructure (patent protection, R&amp;D tax credits) for industrial development.</li> <li>• Create and disseminate knowledge and innovative technology through experimentation and demonstration projects.</li> <li>• Design legislation and regulations that create producer and consumer incentives that favor innovation in products, processes, product–services, and system changes that are energy-saving, environmentally sounder, inherently safer, and employment enhancing.</li> <li>• Create nascent markets for new technology through government purchasing.</li> <li>• Provide favorable tax treatment for investment and for human resource development and use.</li> <li>• Regulate commercial advertising and provide counteracting government messaging.</li> </ul>	<ul style="list-style-type: none"> <li>• Educate scientists, environmental and public health professionals, engineers, material scientists, and energy specialists to design and work together to devise cleaner and inherently safer products and production processes and the provision of services.</li> <li>• Educate consumers and citizens to favor energy-saving, cleaner, and inherently safer products, product–services, and services and to meet their needs with nonmaterial goods and activities wherever possible.</li> <li>• Educate managers, entrepreneurs, business leaders, and workers to understand the need for more sustainable practices.</li> <li>• Educate lawyers to develop laws to guide a transition toward sustainable development.</li> <li>• Educate children to meet their needs with nonmaterial goods and activities wherever possible and to recognize and want sustainable products and activities.</li> </ul>	<ul style="list-style-type: none"> <li>• Through education and communication, encourage consumers and citizens to favor energy-saving, cleaner, and inherently safer products, product–services, and services and to meet their needs (for example, for leisure or recreational activities) with nonmaterial goods and activities wherever possible.</li> <li>• Three main types of consumer need to be considered:             <ol style="list-style-type: none"> <li>1 the individual <i>consumer</i>, who typically purchases items available in the market;</li> <li>2 the <i>commercial</i> consumer, who purchases products made by industry as inputs to its manufacturing processes; and</li> <li>3 the <i>government</i>, which purchases military hardware and materials and equipment for infrastructure and public services.</li> </ol> </li> </ul> <p>There are opportunities within each of these consumer groups to promote sustainable or green purchasing practices.</p>	<ul style="list-style-type: none"> <li>• Ensure that UNIDO has sufficient resources to promote sustainable industrial development that supports competitiveness, protects the environment, and creates meaningful and well-paid employment.</li> </ul>

Source: Adapted from Ashford and Hall (2011b).

Table 13.2 Strategies to improve health, safety, and the environment

<i>Industry initiatives</i>	<i>Government intervention and regulation</i>	<i>Education and human resource development</i>	<i>Stakeholder involvement</i>	<i>International community</i>
<ul style="list-style-type: none"> <li>• Hire specialists in health, safety, environmental impact assessment, and energy.</li> <li>• Integrate marketing, product development, environmental affairs, and human resource efforts by eliminating or transcending the unnecessary divisional divides in the firm.</li> </ul>	<ul style="list-style-type: none"> <li>• Design legislation, regulations, and tax incentives that favor products, processes, product-services, and system changes that are energy-saving, environmentally sound, inherently safer, and employment enhancing.</li> <li>• Remove regulations and tax treatment that create perverse incentives.</li> <li>• Tax unsustainable products and processes.</li> </ul>	<ul style="list-style-type: none"> <li>• Educate scientists, environmental, and public health professionals, engineers, material scientists, and energy specialists on the importance of creating a healthy <i>work</i> and <i>natural</i> environment through sustainable industrial production and consumption.</li> </ul>	<ul style="list-style-type: none"> <li>• Promote NGO activity to press for energy-saving, environmentally sound, and inherently safer products and production.</li> <li>• Devise means to motivate consumers and citizens to press for the regulatory and educational initiatives needed to promote more sustainable industrial production and consumption.</li> </ul>	<ul style="list-style-type: none"> <li>• Press for the signing, ratification, implementation, and enforcement of MEAs.</li> <li>• Open up the negotiation process to include NGOs and labor organizations.</li> <li>• Empower the UNEP as the central institution to coordinate the various MEA secretariats.</li> <li>• Ensure UNEP receives the funding it was promised at Rio+20.</li> </ul>

Source: Adapted from Ashford and Hall (2011b).

Table 13.3 Strategies to enhance meaningful, rewarding, and safer employment and adequate earning capacity

<i>Industry initiatives</i>	<i>Government intervention and regulation</i>	<i>Education and human resource development</i>	<i>Stakeholder involvement</i>	<i>International community</i>
<ul style="list-style-type: none"> <li>• Invest in new products, processes, product–services, and services that enhance employment.</li> <li>• Seek productivity improvements by processes that increase the <i>productiveness</i> of workers.</li> <li>• Invest in increasing the capacity of the firm’s human resources rather than replace labor with capital.</li> <li>• Engage in revenue-enhancing activities and commerce through innovation and performance enhancement rather than through cost-reduction strategies involving the reduction of jobs or wages.</li> <li>• Pay attention to the human–technology interface, that is, optimize matching human behavior with technological artifacts.</li> <li>• Foster healthy industrial relations.</li> <li>• Make changes to the social and hierarchical environment in the enterprise.</li> </ul>	<ul style="list-style-type: none"> <li>• Reject the liberalization of labor markets.</li> <li>• Remove disincentives to hire labor (e.g., remove policies that tax labor).</li> <li>• Promote incentives to use labor.</li> <li>• Support research on mechanisms for job creation (including job design) that go beyond the usual fiscal and tax incentives.</li> <li>• Deliberately enhance the desirable aspects of employment and job creation through labor standards and protections (for example, for health and safety), continuing education and upskilling, tax incentives to employers, and unemployment adjustment policies, including reeducation and unemployment and income guarantees.</li> <li>• Expand the opportunities for capital ownership by workers and ordinary citizens.</li> </ul>	<ul style="list-style-type: none"> <li>• Rethink educational pedagogy, focusing on the acquisition of both technical skills and critical thinking and interpersonal skills involving the ability to communicate.</li> <li>• Improve the means to enhance lifelong training and learning.</li> </ul>	<ul style="list-style-type: none"> <li>• Encourage workers to press both for more stable, more meaningful, safer, and more rewarding employment and for opportunities to acquire capital ownership.</li> <li>• Educate and train workers to contribute to the adoption of more sustainable practices.</li> </ul>	<ul style="list-style-type: none"> <li>• Secure the funding and aggressively pursue the nonpayment of dues by some nations to fully empower the ILO to carry out its mission.</li> <li>• Begin a serious dialogue with the WTO regarding the adoption of core labor rights into the WTO agreements and machinery.</li> </ul>

Source: Adapted from Ashford and Hall (2011b).

Table 13.4 Strategies to promote more sustainable industrial trade

Industry initiatives	Government intervention and regulation	Education and human resource development	Stakeholder involvement	International community
<ul style="list-style-type: none"> <li>• Support or join sustainable trade initiatives/coalitions.</li> <li>• Obtain investment capital from banks that advocate for sustainable trade.</li> </ul>	<ul style="list-style-type: none"> <li>• Encourage national firms to trade from the “bottom of the pyramid.”</li> <li>• Think beyond increasing revenues to the private sector, or the balance of payments, when planning trade strategies such that disadvantaged workers, citizens, and groups in need of special protection are benefited.</li> <li>• Implement the commitment made by developed nations at the Rio Conference to provide financial and technical assistance to developing nations.</li> <li>• More aggressively pursue the adoption and enforcement of codes of conduct in the financing of projects in developing countries.</li> <li>• Increase the transparency and accountability of the activities of export credit agencies and sovereign wealth funds.</li> </ul>	<ul style="list-style-type: none"> <li>• Educate business and finance graduates and public administrators on strategies to promote sustainable trade.</li> </ul>	<ul style="list-style-type: none"> <li>• Press for transparency and accountability on the part of the nation’s trade representative.</li> <li>• Press for consultations of adversely affected and disadvantaged firms, workers, consumers, and citizens with the office of the trade representative.</li> <li>• Press for the inclusion of both core labor standards and environmental protection in trade negotiations and agreements.</li> <li>• Expand multipartite governance used in the ILO to negotiations on both multilateral environmental agreements and trade agreements.</li> </ul>	<ul style="list-style-type: none"> <li>• Develop a consistent, coherent trade policy that removes the conflicts among the different trade treaties by revising the GATT, TBT, and SPS agreements.</li> <li>• Develop a more open-minded approach to respecting the right of individual nations to establish their own degree of health, safety, and environmental protection beyond minimum standards <i>on a precautionary basis</i>, reflecting their cultural preferences.</li> <li>• Recognize the importance of securing the protection of labor and human rights in all trade agreements.</li> <li>• Open up the panel process to inputs from NGOs and environmental and labor organizations.</li> <li>• Consider adopting a multipartite governance structure.</li> <li>• Resolve conflicts in requirements and philosophies among MEAs, TRIPS, WTO and other trade regimes, and national environmental and public health protection laws.</li> </ul>

Source: Adapted from Ashford and Hall (2011b).

In presenting these recommendations, we recognize that there are likely to be significant barriers to their implementation. Who is likely to win and who is likely to lose in the transformation of the industrial state towards sustainability is a question that has to be addressed. Persons, firms, and governments who benefit from maintaining the status quo or continuing its trends may drive us deeper into unsustainability. They can create a major source of lock-in and path dependence. Further, they can stand in the way of different actors who may provide better pathways. (See the discussion in Chapter 12 of a technology diffusion deficit, rather than an innovation deficit, in energy technology.)

To address these concerns, legal interventions and policies should focus on “opening up the problem space,” rather than just trying to enhance the *capacity*\* of existing actors to change. Policies are also needed to “open up the participatory and political space.” These include using the power of legal compulsion through law and legal institutions, antitrust law, the limiting of unjustified profiteering, the cessation of rewarding excessive consumption of both materials and energy, subsidizing the wrong kind of production and provision of services, countering and punishing financial corruption and fraud, and fair employment and wage policies.† Sustainable development requires stimulating revolutionary technological innovation through environmental, health, safety, economic, and labor market regulation. Greater support for such regulation is likely to be found if new voices are able to contribute to integrated thinking and solutions.

In summary, a sustainable development approach must be fashioned to create a competitive and green economy that creates safe, meaningful, and well-paid employment and sufficient earning capacity within the context of rapid technological change and changes in globalization.

### 13.3 Inequality, employment, wages, and earning capacity within the nation–state

While it is possible that the next (fifth) industrial revolution (see Section 3.3.1.1 in Chapter 3) will be driven by innovation in artificial intelligence and advances in information and communication technologies (Brynjolfsson and McAfee 2014; Bivens 2017), it is not yet clear to what extent such innovation-driven growth may “hollow out the middle class.” Carlota Perez (2016) draws a more optimistic picture providing economies “go green” in response to clear socio-political choices (see Section 3.3.1.1 in Chapter 3). See also the contrasting discussion by Hoffmann (2011) of why going green is not enough.

As should be evident from the previous section, a major argument of our work is the need to place employment, wages, and earning capacity considerations on par with environmental and economic considerations as one strategy to reduce inequality and increase access to essential goods and services. Just as thinking about the environment before industrial development is planned and implemented is necessary to optimize environmental quality, consideration of labor and income concerns also require deliberate and intelligent actions before embarking on (re)industrialization efforts in guiding industrial transformations. In this section, we explore ten options that have been presented as ways to reduce inequality and/or improve wages/earning capacity.

\* In addition to capacity, initiatives need to create opportunities for, and willingness to engage in, change/innovation. See Sections 7.6.1 to 7.6.3 in Chapter 7 for a discussion of willingness, opportunity/motivation, and capacity/capability for change, respectively. All three elements are necessary for firms to adopt new innovations and generate their own innovations.

† See Speth (2008, 2010a) for policies to foster more democratic institutions, to minimize corruption of the social contract, and to limit the influence of corporations. These policies address campaign-finance reform; changes in the laws affecting corporations, mergers, and bankruptcy; and electoral process changes, among other issues.

The recent downturn of the extraordinarily long economic boom combined with the 2008 global financial crisis has revealed fundamental structural employment problems in industrialized economies.\* Piketty's (2014) work on *Capital in the Twenty-First Century* further shows that wealth inequality is increasing and heading back to the levels seen before World War I.† Thus, industrialized nations face a challenging future in terms of being able to provide citizens with meaningful employment and adequate earning capacity that can begin to close the inequality gap between the rich and middle class/poor. In fact, without specific interventions that can redistribute (or distribute) wealth, well-paid employment may not be sufficient to reduce inequality.

Decoupling strategies deployed to promote a green economy may only have a marginal result in creating jobs. Thus, while economic growth may be decoupled from environmental impacts, the process may not adequately impact inequality because of important structural changes in technology and global finance.

We agree with Smith et al. (2010) that *overall* wealth and consumption are unlikely to decline in the medium term, but see a critical need to focus on employment and earning capacity alongside the emphasis they place on innovation. We also see the need to broaden the focus on technological innovation to include organizational, institutional, and social innovation.

A key question, then, is what options exist to promote employment and earning capacity in the face of the technology-based displacement of jobs by the very process of creative destruction we advocate? In fact, a revolutionary (as opposed to evolutionary) pace of change that disrupts existing industrial processes could have dramatic impacts on employment, where dirty industries are replaced by green enterprises or cooperatives that require a workforce with an entirely new skill set and organizational structure. The form and size of these green enterprises or cooperatives is likely to vary significantly by sector and geographic area, so it is difficult to know if they would create more or less jobs. While such dilemmas present challenges to advancing a sustainable development agenda, there are several specific options (discussed below) that are worth exploring.

In general, earning capacity can be enhanced by some combination of two contributions – wages earned through employment and money earned through the ownership of productive capital. The former requires the restructuring of work to enhance the contributions and *productiveness* of labor – as opposed to increasing labor productivity by enhancing the productiveness of physical capital (N.A. Ashford et al. 2012a, 2012b).‡ The latter includes

\* The 2009 Nobel Prize in economics was given to three economists who demonstrated that some unemployment is inevitable, even in economies that are in equilibrium because of “search friction” – also known as “structural unemployment” or “equilibrium unemployment” – because of the mismatch between the skills of the current workforce and the needs of employers (Cho 2010, p. 330). Unemployment exists alongside vacancies in jobs. In the United States, while structural unemployment was considered to be 2–3 percent, equilibrium unemployment seems to have now approached a number that is two or three times that historical measure. For a contrary view, see Romer 2011 who argues that most of U.S. unemployment is the consequence of low demand for goods and services by consumers, which in turn is fueled by high unemployment among them, as well as by the collapse of the housing market and unprecedented indebtedness. Neither view emphasizes technological displacement or trade as major factors.

† While such trends have been well documented for specific countries and regions – for example, see Krugman's (2007) analysis of the U.S. economy – Piketty's analysis of data from twenty countries provides a unique perspective on how wealth and inequality have changed over the past century across the globe. For an informative critique of Piketty's work, see Galbraith (2014).

‡ We distinguish *productiveness*, which refers to the inherent contributions of labor or capital to output, from *productivity*, which is an artificial ratio of output per unit of labor or capital. A more productive machine that is capable of faster output provides an example of capital productiveness, whereas a more productive worker (due to enhanced skills/knowledge) who is more creative, can work faster, and/or

ordinary investment from wage savings that people might make through the purchasing of stocks, bonds, and property; changes in ownership structures of businesses through mechanisms such as employee stock ownership plans (ESOPs); and enabling people to acquire capital with the future earnings of capital through borrowing – based on binary economics (R. Ashford et al. 2012; R. Ashford 2013).

In Box 13.2, we list interventions that include not only structural and technological changes, many of which are discussed in greater detail below, but also changes in the purchasing power of workers, consumers, and citizens that are essentially income and wealth transfers that could be implemented independent of technological and structural changes of the economy. They require a dramatic shift in political leadership and social commitment. They are increasingly discussed more seriously in Europe than in the U.S.

A point worth re-emphasizing is that from a Schumpeterian perspective, liberalizing the labor market with greater employer freedom to lower wages, shed labor, and utilize temporary or contingent employment rewards those who do not effectively utilize human skills and talents (Kleinknecht 1998, 2015). This again underscores the failure of neo-classical economics to take the dynamics of both economic and social innovation into account.

### **Box 13.2 Interventions to address inequality, wages, and purchasing power**

- Redistribute income and wealth
  - Change the taxation of income and wealth (see the discussion of Option 1)
  - Increase the minimum wage
  - Provide a guaranteed minimum income
  - Pay those doing unpaid work, such as child-rearing/care of the elderly
- Change the effective taxing of labor and pollution/energy by taxing pollution/energy and reducing the tax on labor
- Engage in Keynesian spending (see the discussion of Option 2)
- Shorten the workweek with or without a reduction in wages (see the discussion of Options 3 and 4)
- Supplement the shortfall in paid wages during economic downturns (see the discussion of Option 5)
- Increase the contribution of employment to productivity improvements by designing work back into the production process and the delivery of services (see the discussion of Option 6)
- Redesign products, production processes, services, and systems (see the discussion of Option 7)
- Change the nature of consumer and human-centered demand (see the discussion of Option 8)

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produce higher-quality outputs provides an example of labor productiveness. As a statistical artifact, either form of productiveness can increase labor productivity. Thus, it is important to know the productiveness of labor, capital, and the labor–capital interface because this provides a more accurate measure of where a company’s/nation’s competitiveness lies – i.e., in its capital, its labor, the interface between the two, or a mixture of two or more of these elements. Energy also has to be accounted for as an independent source of economic growth (Ayres and Warr 2009).

- Adopt the recommendations of Marjorie Kelly in *The Ownership Society* in creating “B-corporations” to invest in public services (see the discussion of Option 9)
- Increase the participation of workers in employee stock ownership plans (ESOPs) in their places of work (see the footnote on ESOPs in the discussion of Option 10)
- Institutionalize the central tenets of binary economics allowing people to gain income from collectivizing their financial capital currently restricted to banks and investment cartels (see the discussion of Option 10)

As discussed in Section 3.5.2 in Chapter 3, Halina S. Brown (2016) poses the relevant question of how to address income inequality while also promoting sustainable consumption. Her key finding is that household income is a strong predictor of that household’s carbon footprint. Specifically, as shown in Figure 3.4 (in Chapter 3), among the U.S. households the correlation is linear for the bottom 80 percent of income categories (up to approximately \$120,000 for a family of four) and accelerates above it (Ummel 2014). In other words, the more we earn, the greater our greenhouse gas (GHG) footprint is. As a consequence, if we were to decrease income inequality by reducing the number of households with the extremes of income (at the top and at the bottom) and increase the number of households in the central categories, total consumption-based GHG emissions would remain more or less the same. However, if we reduced the proportion of households in the lowest income bracket by moving them into the middle-income category, without touching the households in the top category, the total emissions would increase. **The conclusion of this analysis in terms of inequality and sustainable consumption is that raising the income of those who most need it will result in greater total greenhouse gas emissions unless we simultaneously reduce the income at the top.** Of course, there are other complementary policies that can reduce GHG emissions related to embracing the idea of the circular economy, de-materializing and de-energizing products and services, and reducing consumption across the board. Interventions discussed throughout this chapter address all these complementary initiatives in greater detail.

In the text below, we discuss a range of options that could reduce inequality and promote employment and earning capacity.

- 1 *Transfer wealth or income from capital owners and highly paid workers to those underemployed or unemployed – a redistribution of wealth or income.*

The idea that redistribution measures can be effectively used to close the inequality gap is not without historical precedent. By looking at over a century of tax data, Piketty (2014) makes a convincing case that progressive taxation following World War II – which reached 90 percent or higher on the highest incomes in the U.S., Britain, and Germany during the 1940s – is associated with declining inequality during the same period. Also, the rapid decline in taxes on the highest incomes that began during the Reagan and Thatcher era in the 1980s mirrors the growth in inequality that occurred over the same time period. In a smaller study, Prasad (2008) assessed the redistribution of income through taxes, social transfers (social insurance, pensions, and unemployment insurance), and social expenditures (education, health, water, and other social services). By reviewing over fifteen years of data in a large number of developed and developing countries, he found that the redistributive impact of taxes and social transfers, which became increasingly regressive over time, have not been able to reverse income inequality. On the other hand, as experience

in Mauritius, Malaysia, the Nordic countries, and for low-income people in Brazil has shown, social policy can be used more aggressively to address inequality without adversely affecting growth or employment objectives. Both tax (fiscal) and social policy are needed to support employment objectives. Bivens and Blair (2016) make a strong case that progressive taxation is just what we need today. See also Goodwin (2014a; 2014b; 2017).

A challenge now facing efforts to promote redistribution policies is the ease at which capital can move around the world in search of tax havens. There is certainly a fear that executive talent and wealth will flee any country that significantly raises taxes to the detriment of the economy. However, it is far more likely that any changes that occurred would have a limited impact on economic productivity (Piketty 2014). Perhaps, the more challenging problem is the influence of the wealthy on policy formulation (Gilens and Page 2014).<sup>\*</sup> Given the likely extent and duration of taxation required to close the inequality gap, it is unlikely that a progressive and significant redistribution agenda could be established and maintained in the current political climate. Further, a redistribution agenda by itself does not directly address environmental concerns. Thus, at least for the near term, we are convinced of the need for other financial mechanisms that can *distribute* (as opposed to *redistribute*) wealth based on market principles (see Option 10).

2 *Engage in Keynesian spending for labor-intensive projects improving infrastructure, with government and taxpayers footing the bill.*

Following the 2008 financial crisis, the U.S. engaged in a modest Keynesian approach to job creation in the face of insufficient current demand for public services. In 2009, Congress enacted the American Recovery and Reinvestment Act (ARRA). The act increased funds to state and local governments by increasing federal matching funds on items such as Medicaid and education; extending and expanding unemployment benefits; purchasing goods and services, for example, by funding multi-year infrastructure projects; and providing temporary tax relief for individuals and businesses (CBO 2013). The stimulus package was funded through deficit spending, with the final budget deficit estimated to be \$830 billion between fiscal years 2009 and 2019 (CBO 2014).

While the impact of such stimulus programs is likely to be effective over the short term – for example, it was estimated that ARRA created 76,000 new jobs during 2013 – the long-run impacts could result in a reduction of economic output (CBO 2014). Thus, as a strategic policy option, it presents only a temporary solution and may only promote sustainable development if the program is specifically targeted at green investments.<sup>†</sup>

3 *Spread existing work out over a larger population by shortening the workweek, but without maintaining wage parity.*

\* An important empirical study of 1,779 policy issues in the U.S. provides compelling evidence that economic elites and organized groups representing business interests have a significant impact on U.S. government policy (Gilens and Page 2014). In contrast, the average citizen and mass-based interest groups were found to have little or no independent influence.

† A study by Pollin et al. (2008) calculated how many jobs would be created in the U.S. by a \$100-billion green stimulus program. According to their model, a \$100-billion green stimulus is projected to create two million jobs, while a “traditional” stimulus in house hold consumption would create 1.7 million jobs. Notably, spending \$100 billion within the U.S. oil industry would create only around 542,000 jobs (ibid.). Apart from the elevated performance of a green stimulus in job creation, it also entails a series of long-term benefits, including increased consumer savings through the reduction of energy bills; the stabilization of oil, gas, and coal prices through reduced demand and increased energy diversity; and, obviously, a cleaner, low-carbon environment (ibid.). See Section 5.3.2 in Chapter 5 for additional commentary on the effects of a greener economy on employment.

One potential strategy to increase employment is to spread available work among a greater number of people by reducing the number of hours worked each week. If no adjustment is made to hourly pay, such an action would represent a redistribution of wage income from existing workers to a larger pool of potential workers. Many commentators advocate spreading out the work without addressing the question of the level of overall wages paid (Jackson 2009; Schor 2010, 2010b, 2010c; Speth 2010a). By itself, increasing the number of workers employed does nothing or little to redistribute the share of profits of industrial production or the provision of services from capital or business owners to workers. Asking wage income to be shared by more workers under the euphemism of enticing some workers to either enjoy more leisure time or to spend more time taking care of their children and their elderly parents\* seems to ignore the fact that the majority of those working in a depressed economy want to work more, not less. And, of course, these two activities – leisure and home care – are not the same. Workers are also likely to demand higher hourly wages for a shorter workweek to maintain wage parity or seek a second job, leading to higher job turnover and net unemployment for some groups. For these reasons, the French adoption of a thirty-five hour workweek was for a while at best a temporary moderate financial success for most workers, but not successful for some, and it had mixed results on conditions of work and gender (Hayden 2006).† The overall level of employment was essentially unaffected (Estevão and Sá 2008).

Those who advocate for a reduced workweek, tend to associate the strategy with objectives such as enhancing “work–life” balance, reducing unemployment during economic downturns (see Option 5), or reducing environment impacts through reduced consumption and less energy-intensive living patterns (Coote and Franklin 2013). Thus, if adopted, the strategy should be considered alongside broader efforts to restructure physical and social structures to advance sustainable development. For example, it is possible that a reduced income via a shorter workweek would not present a problem if basic goods and services, such as health care, were made affordable or provided for free. Under such a scenario, the provision or financing of these goods and services could be achieved through cooperative models of service provision (see Option 9) or a binary economic system of corporate finance (see Option 10), respectively.

#### 4 *Spread out existing work over a larger population by shortening the workweek, but with the maintenance of wage parity.*

One way that a shorter work policy could succeed without making any radical changes in physical and social structures, would be to ensure that worker pay remains unchanged through the transition. Thus, workers would effectively be paid more per hour to maintain their income. Such a strategy would require a *redistribution* of income from either profits or the tax base (see Option 1) or a *distribution* of income earned by giving workers market opportunities to acquire capital with the future earnings of capital, based on

\* Ironically, giving high-wage workers more leisure time to care for their children or parents is likely to displace low-wage care-givers and reduce their consumption, which is already low from an equity perspective.

† Hayden (2006) provides a detailed analysis of the implementation of the shorter workweek with some wage retention that was accomplished by reducing the payroll taxes levied on employers. Thus, rather than wage parity maintained by transferring wealth from employers to workers, it was actually accomplished indirectly by transfers from the taxpayers to the workers. Even so, because of concessions in work-time flexibility of hours (including evening and weekend work) that could be demanded – on short notice – by employers of their workers in any particular week, the advantages of extra leisure time were compromised by uncertainty in time demands on workers, especially those that were lower-paid and less-skilled, as well as reductions in overtime pay.

binary economics (see Option 10). See Ashford and Kallis (2013) and Kallis et al. (2013) for a deep discussion of the benefits and difficulties associated with a shorter workweek.

- 5 *Limit the elimination of jobs during economic downturns; supplement the shortfall in paid wages for workers on furlough or working shorter weeks from a government-administered, employer-financed fund.*

It is common practice in the U.S. to lay off workers during economic downturns. However, such action could leave firms without a skilled workforce when the economy recovers if the workers have found employment elsewhere. To address such problems, Germany, Austria, and several other European countries have established “Kurzarbeit” (short work) policies that encourage employers to retain workers – for six to eighteen months – during periods of economic decline. For example, in Germany, employees could either be on furlough or a shorter work schedule with the wage shortfall made up by a government fund to which employers had contributed in better times (Kulich 2010). Incentives can also be offered to encourage workers to obtain additional training and skills during their period of Kurzarbeit (see Option 6). When compared with the U.S. economy, the Kurzarbeit policy in Germany enabled firms to realize impressive growth as the economy began to recover in 2010 (ibid.).

The success of internal flexibility mechanisms such as the Kurzarbeit policy indicates that the direct protection of jobs, rather than indirect monetary and fiscal policies, may be a policy direction worth serious attention.

- 6 *Increase labor’s contribution and therefore its claim on the profits from production and services by upskilling and redesigning work back into production and services.*

The achievement of this objective would require a redesign of labor’s role in commercial activities that would reverse the decades-old trend in replacing labor with capital. Knowledge applied in an iterative way (knowledge injected periodically or continuously over time) can have a cumulative effect, with new knowledge building on past knowledge acquisition and investment. This is akin to adding financial flows to previous investments that have accumulated and appreciated in value and is unlike investments in physical capital that depreciate in value over time because functionality decreases due to regular utilization. Knowledge capital, even if it sometimes becomes less valuable over time, may nonetheless grow (accumulate) from using it and adding to it over time (Foray 2006). This observation has direct relevance for the choices that are made as to which factor endowments to invest in to produce a product or provide a service. Hardware deteriorates, but knowledge held by a skilled person who continues to learn can appreciate in value for many years.

Given the labor-displacing potential of technological innovation, Brynjolfsson and McAfee (2014) call for a significant research and development effort to target innovation at augmenting human ability rather than substituting for it. Similarly, we have argued for the need for radical improvements in the human–technology interface that creates new relationships between human capital and technology (Ashford and Hall 2011b). Rather than educating students and professionals in how to remove labor from the production process – using techniques such as lean manufacturing – a far more challenging and worthwhile endeavor would be to find ways to reintegrate meaningful work back into the industrial economy. To this end, the 2018 MIT Inclusive Innovation Challenge may have the potential to advance new ideas on how to create meaningful and well-paid employment in a digital economy.\* The current economic growth strategy that essentially replaces

\* See <http://www.mitinclusiveinnovation.com/the-challenge/> (accessed February 11, 2018).

labor with physical capital and energy under the guise of promoting efficiency and productivity is unsustainable. Redesigning the nature of work by searching for symbiotic relationships between humans and technology is one way to promote the earning capacity of workers. The alternative is to accept that capital will continue to displace jobs and search for other mechanisms to distribute wealth (see Options 1 and 10).

- 7 *Meet essential human needs in a less-expensive and less resource-intensive way by redesigning products, production, services, and systems.*

Innovation will play a central role in the delivery of sustainable goods and services. In this work, we have expressed the need to pay attention to technological, organizational, institutional, and social innovation, each of which could fundamentally change the supply and/or demand for goods and services, with equally significant changes on employment and income.

Innovation can be considered from four different perspectives:\*

- 1 *Product changes* (for example, the creation of a new product/technology/service);
- 2 *Process changes* (for example, improvements or efficiency gains in the process of manufacturing a product or delivering a service);
- 3 Shifts from products to *product-services* (for example, purchasing a photocopying service rather than a photocopying machine); and
- 4 More far-reaching *system changes* (for example, a dramatic realignment of producers, service providers, and other actors to create entirely new ways of delivering a product or service – perhaps through a cooperative; see Option 9).

The first two categories have received the most attention in the literature on job displacement and wage inequality (Vivarelli and Pianta 2000). In particular, process changes – productivity gains that occur because of the improved productiveness of capital (such as the use of more efficient technology) – are often cited as the main cause of job displacement (see the several works of Autor and Acemoglu discussed in Section 5.2.1 in Chapter 5). In Europe, the concern that process innovation was displacing jobs led to a growing interest in product-service innovation/systems (Mont and Tukker 2006; Tukker and Tischner 2006). These types of innovation are targeted on ways to sell “need fulfillment” rather than products that the customer must then use to satisfy his or her own needs. For example, the decision of Xerox to sell a photocopying service rather than photocopying machines means that customers no longer need to worry about owning and operating equipment. This new form of business model also means that Xerox must rethink the design of its machines for ease of recyclability and longevity – two factors that are critical to reduce the ecological footprint of products. It will be interesting to see how this type of product-service model will take shape in the emerging autonomous vehicle market. For example, will automobile manufacturers completely rethink the design, durability, and recyclability of their vehicles if they will ultimately be responsible for their entire lifecycle?

A critical aspect of product-service innovation is that labor can be essential to integrate technology (a product) and its associated service(s). Thus, a fruitful avenue of research would be to consider how product-services can contribute to competitiveness, more sustainable production and consumption patterns, and create meaningful and well-paid employment. Further, it is worth stressing that all four types of technological change – technological, organizational, institutional, and social – are necessary to achieve sustainable development.

\* See Section 6.2.1 in Chapter 6 for a discussion of the different types of technological innovation.

Rigid industries whose processes have remained stagnant face considerable difficulties in becoming significantly more sustainable. Shifts from products to product–services rely on changes in the use, location, and ownership of products in which mature product manufacturers may participate, but this requires significant changes involving managerial, institutional, organizational, and social (i.e., customer; see Option 8) innovations. Changes in sociotechnical systems, such as transportation or agriculture, are even more difficult. This suggests that the creative use of government intervention – through a sustainability-focused national industrial policy – is a more promising strategic approach for achieving sustainable industrial transformations than relying on more neoliberal policies.\*

- 8 *Change the nature of consumer and human-centered demand by encouraging cultural change more focused on using disposable income on services with significantly less capital and energy intensiveness and much more labor-intensiveness.*

Changing the nature of demand is fundamental to the sustainable consumption movement. It requires not only a decrease in material- and energy-intensive products and services, but also anticipates a shift of demand from “stuff” to human services – see Jackson and Victor (2011), Cohen et al. (2010), and Bengtsson et al. (2018).

One strategy that could influence consumer purchasing to support labor would be to create a “made by humans” label (Brynjolfsson and McAfee 2014). Similarly, a label could be developed to indicate whether a product or service is “inherently sustainable.” Such a label could take the full lifecycle into account and only be granted to a product or service if it has a negligible negative impact on the environment and society. Ideally, the certified product or service would enable the environment and society to flourish.

- 9 *Promote the creation of cooperative economy to broaden ownership.*

The cooperative economy involves the replacement of capital ownership in its present corporate form by private investment of individuals promoting sustainable development in so-called “benefit corporations” (Kelly 2012).<sup>†</sup> Business models that support a cooperative economy include cooperatives, employee-owned firms, credit unions, community land trusts, foundation-owned companies, and any form of organization that is owned and controlled by its workers or community. The notion of a cooperative workplace has a long history that reaches back to the 1844 Rochdale Principles,<sup>‡</sup> which provide the foundation for the Cooperative Principles (or values) – including democracy, equity, and common ownership of property – that underlie modern day cooperatives.<sup>§</sup> Cooperative ownership structures can be found in many sectors

\* See Chapter 8 for a discussion of government policies to foster innovation, economic growth, and employment.

† See also Quarter et al. (2009) for an informative discussion of the “social economy” in Canada. The social economy is an umbrella term that relates to a wide range of organizations focused on meeting social needs and which have economic aspects such as the payment of wages and benefits to employees. The social economy is perhaps a broader notion than the cooperative economy, but they have much in common. For a discussion of the emerging social economy in Europe, see Borzaga et al. (2014).

‡ See the Co-operative Heritage Trust, *The Rochdale Principles*, <http://www.rochdalepioneersmuseum.coop/about-us/the-rochdale-principles> (accessed December 19, 2017).

§ For more information on existing cooperatives, see the International Co-operative Alliance (ICA), which was established in 1895 “to unite, represent and serve co-operatives worldwide” (source: ICA, The Alliance, <https://ica.coop/en/whats-co-op/co-operative-identity-values-principles>, accessed December 19, 2017). See also the National Cooperative Business Association (founded in 1916 as the Cooperative League of the United States of America), that supports cooperatives that are jointly owned and democratically controlled (source: NCBA, <http://www.ncba.coop/>, accessed December 19, 2017).

of the economy, especially in healthcare provision, retail, food stores, agriculture, art, and restaurants. Cooperatives are less likely to be found in large-scale manufacturing or pharmaceutical firms that engage in significant research and development. These larger organizations are the primary targets for Option 10, which focuses on a new approach to corporate finance/investment.

If Brynjolfsson and McAfee (2014) are correct and technological innovation (specifically, “digitization”) is set to displace vast numbers of workers with “ordinary” skills and abilities, the question is how will these people engage in the economy? The cooperative economy presents one strategy for creating employment that can deliver essential goods and services to communities and regions. The democratic nature of cooperative organizations\* means that the owners decide what work they wish to engage in and what remunerative rewards they should receive. Thus, there is potential for greater wealth, should the owners decide to pay themselves higher incomes (Hoffman 2012). Further, the place-based nature of cooperatives means they are directly concerned with issues such as the vitality of the local community and environment.† The emphasis cooperatives place on equity provides an avenue to address gender-based inequalities in the workplace (Rothschild and Tomchin 2005) and similar issues related to workforce diversity (Meyers 2005). The modern cooperative movement has also been linked with the social conditions that can promote greater happiness (Kaswan 2014). All of these benefits result in what is called the “cooperative advantage” of jointly owned and democratically controlled organizations over investor-owned firms (Birchall 2003; Novkovic 2008). The democratic nature of cooperatives also asks (or perhaps challenges) its members to reconcile their own personal interest in democratic citizenry with the capitalist demands that come with business ownership. Schoening (2005, p. 293) argues that by reconciling these two perspectives, “cooperatives develop a spirit of Cooperative Entrepreneurialism that allows them to engage in free enterprise, while also adhering to the cooperative values of equality and democracy.” Such an alignment of interests may be essential to create truly sustainable goods and services. Put differently, it may be more challenging to transform investor-owned firms where the interests and incentives for employees and owners are not naturally aligned.

While the ecological, employment, and democratic benefits from a cooperative economy are promising, a critical question is whether the broader capital ownership through cooperatives would be sufficient to close the inequality gap. As long as for-profit corporations exist and continue to advance an “extractive ownership” model (Kelly 2012), the financial wealth being created (i.e., profits, retained earnings, and increases in share prices) and concentrated is likely to be far greater than that generated from cooperatives,‡ which also intentionally distribute their wealth among a great number of people. Thus, additional mechanisms may also be needed to broaden the wealth being created by capital, as opposed to labor, productiveness (see Option 10).

Finally, as the number of benefit corporations continues to increase in the cooperative economy (Surowiecki 2014), specific mechanisms may be needed to enable these organizations to remain viable during economic downturns. Whereas for-profit organizations

\* An important work by Rothschild and Whitt (1986) demonstrated the centrality of building organizational processes that enabled members’ voices to be heard and considered, namely substantive workplace democracy, for cooperative organizations to remain intact and vigorous.

† In many ways, cooperatives could be described as advancing the notion of *eco-development*, which promotes ecologically sound regional development (see Section 2.3 in Chapter 2).

‡ More favorable tax treatment of dividends and profits associated with cooperatives, as compared with conventional corporations, could be justified since cooperatives also create public benefits for their intended societal beneficiaries that may not be captured or appropriated by the cooperative investors. Thus, wealth creation in cooperatives includes both private benefits and public goods. Traditional investors are usually indifferent to the creation of public goods that they cannot directly profit from.

can shed labor or curtail their social programs/mission without being sued by their shareholders, benefit corporations (especially those certified as a “B Corp”)\* must adhere to both their social and fiduciary responsibilities. Thus, enabling benefit corporations to take advantage of, for example, the *Kurzarbeit* (short work) policy (see Option 5) may provide an important lifeline for these corporations during periods of economic turmoil. Similar policies may be needed to enable benefit corporations to remain competitive with for-profit corporations, or at a minimum create a more even playing field if needed.

- 10 *Better enable poor and middle-class people to become owners by extending to them competitive market opportunities to acquire capital with the future earnings of capital, based on binary economics.*<sup>†</sup>

The mechanism by which competitive market opportunities for poor and middle-class people to acquire capital with the future earnings of capital, based on binary economics, is described in Section 3.6.1 in Chapter 3. It should be stressed, however, that the approach presented here is one of a number of potential ways in which a binary income could be earned.<sup>‡</sup>

Binary economists’ fundamentally different view of economic growth has important implications for how they think about how economic growth can be more effectively promoted and how people can participate in this growth. Conventional economists assume that the gains for most people must come in the form of more jobs and higher wages, lower prices for goods and services, and welfare redistribution – all functions of productivity improvements. Binary economists, on the other hand, see far greater potential gains for most people by enabling them to expand their participation in the economy by acquiring capital. According to binary economics, a broader distribution of capital acquisition provides the rational expectation of more broadly distributed capital income in future years to people with a higher marginal consumption spending rate, and therefore more incentive to employ capital and labor in earlier years. This principle is called the principle of binary growth (R. Ashford 2013).

If the effect of technological innovation is to displace, reduce, and supplement the contribution of labor to production while increasing the contribution of other kinds of capital, binary economists argue that we need to employ the existing mechanisms (that presently enable well-capitalized people to acquire that capital with the future earnings of capital) more broadly to enable *all people* to acquire a share of this growing capital productivity (R. Ashford 1998). More specifically, like people who are already well capitalized, every individual needs to be enabled to acquire capital, not merely with the earnings of

\* See “The B Corp Declaration,” available at <https://www.bcorporation.net/> (accessed December 19, 2017).

† We would like to thank Robert Ashford for his contribution to the description of binary economics in this section and throughout this work.

‡ Many people are unaware that the rationale for the ESOP (employee stock ownership plan) stems from the theory of binary economics (R. Ashford 2006). In its current form, the ESOP provides a limited mechanism for workers to acquire capital through a combination of deferred labor compensation, future company revenues, and corporate tax deductions. Thus, significantly revising the structure of the ESOP and expanding who can receive a binary income from the scheme would be one way in which the theory discussed in this section could be applied. Further, extensive research on firms with ESOPs has found that organizations with a participatory culture *and* profit sharing – i.e., they have a cooperative structure (see Option 9) – tend to outperform those that do not have both of these elements (Blasi et al. 2013). Thus, the ESOP could be a valuable performance-enhancing mechanism in a cooperative economy.

labor, but also increasingly with the earnings of capital. R. Ashford (2006, p. 12) provides the following arguments for broadening (or democratizing) the acquisition of capital.

Compared to well-capitalized people, poor and working people are severely disadvantaged when it comes to acquiring capital. In general, mainstream economic policy requires them to acquire capital by using their current labor earnings while those who already own substantial capital can acquire additional capital either with their capital earnings or with borrowed money that is repaid with the earnings of the capital acquired. Because most employees need their current labor earnings to provide for their families' current living expenses, [Louis] Kelso proposed an approach to capital acquisition that does not require workers to use their current labor income either but rather enables them to acquire capital using the future income of the capital acquired just as wealthy people are presently able to do.

Binary economists maintain that (1) using labor earnings is *not* the best way for poor and working people to acquire capital and (2) limiting capital acquisition with the earnings of capital primarily to wealthy people is *not* the best way to promote economic growth and prosperity. According to government statistics, almost all non-residential capital in the United States is acquired with the earnings of capital; and very little non-residential capital is acquired with the earnings of labor. Most poor and working people do not have enough labor earnings to support themselves and their families and consequently find themselves increasingly in consumer debt. If most poor and working people are ever to acquire viable capital estates and eliminate their consumer debt, they will need to acquire capital with the earnings of capital just as wealthy people do.

Allowing people to use binary income as they desire is the simplest application of the theory (as suggested in Options 3, 4, and 9), and aligns with the principle of binary growth, but there are other ways in which the income could be used. For example, the binary income could be limited to spending on products and services that are certified as “inherently sustainable” and/or “made by humans” (see Option 8).<sup>\*</sup> Such action could be a useful way to create new markets for the next generation of sustainable products and services. Alternatively, the binary income could be used to subsidize (or provide) services such as health care for the poor or welfare payments.

One critical difference between the binary economic solution and that presented in Option 1 is that binary economics is concerned with broadening the voluntary process of *distribution*, whereas Option 1 focuses on *redistribution*.<sup>†</sup> In the binary analysis, the consequences of concentrated ownership – which in conventional economics are either ignored, treated as at best a secondary matter, or touted as a beneficent source for the creation of jobs or the payment of welfare redistribution – are viewed instead as a significant impediment to fuller employment and a monopolistic suppression of greater growth potential. The binary economics solution focuses on enabling people to increase their earning capacity by acquiring capital via voluntary transactions with the *future* earnings of capital. In contrast, redistribution mechanisms seek to tax current income and wealth.

\* The task of classifying whether a product or service was “made by humans” is likely to face significant definitional and theoretical challenges. For example, if a worker controls a complex machine to manufacture a product, can this product be classified as human made? Binary economists maintain that the cost of employing capital and labor is the most objective measure of the value of the work each productive input contributes to production.

† For an explanation of how the binary approach does not involve any redistribution, see R. Ashford (2013) and R. Ashford et al. (2012b).

Thus, while the binary solution would not address the *existing* levels of inequality described by Piketty (2014) and others (Krugman 2007),\* it would provide low and middle-income groups with a mechanism to substantially enhance their future earning capacity by supplementing any labor income and transfer payments they receive with capital income, which could help close the inequality gap or prevent it from growing.

One sustainability concern with the binary economic solution is that it predicts that substantially more economic growth would result from broadening capital acquisition with the future earnings of capital than would result if the same capital acquisition were more narrowly acquired.† The prospect of this substantial incremental growth could have severe implications for the environment.‡ In response to such concern, R. Ashford and Shakespeare (1999, pp. 379) argue that

the promise of binary growth is a promise of green growth. It includes the promise not only of a population better able to afford more food, clothing, shelter, health care, transportation and communication around the world but also the promise of greener products, greener processes, greener activities and tastes as well as a consumer population with stronger property interests in the environment and better able to afford the greener choice.

We believe that without a social innovation in consumer demand, it may be necessary to channel the use of binary income as described above.

Finally, whereas Kelly's (2012) "generative" (or cooperative) economy advances an alternative corporate structure that would hopefully spread ownership and operate in a more socially responsible manner (see Option 9), binary economics offers a way for major national and multinational corporations to reform their approach to corporate finance by operating in a more ethical and profitable way. Given that both types of organization will coexist for the foreseeable future, it is important to think about how they might both advance the sustainable development agenda. If adopted by major national and multinational corporations, a binary economics approach could enable corporations to (1) spread ownership among their employees, customers, "neighbors" (e.g., people living near corporate facilities in poor neighborhoods and company towns), and other targeted groups (without requiring personal payroll deductions or other investments on their part); (2) enhance the earning capacity of those receiving the binary income; and (3) spawn an economy in which sustainable production is more affordable, politically favored, and more conducive to sustainable and environmentally friendly growth. Given the potential ways in which a binary solution could help advance a sustainable development agenda, we believe the approach deserves some serious attention.

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\* See the ongoing analysis of the "State of Working America," by the Economics Policy Institute (EPI), for a useful review of wealth, incomes, wages, and employment in the U.S. (Source: EPI, <http://www.stateofworkingamerica.org/> (accessed December 19, 2017).

† We believe that the potential for binary growth should also be assessed in the context of Robert Ayres's observation that past economic growth owes much of its success to cheap sources of energy that he maintains will not continue in the future (Ayres and Warr 2009).

‡ The same sustainability concern could be levied on any economic strategy designed to promote growth. However, growth strategies that do not have an explicit mechanism to distribute wealth more broadly may distribute any increase in costs related to a green transition disproportionately (and unfairly) on the poor and leave them comparatively less financially able to bear them.

Deliberately focusing on the above options, rather than attempting to return to a traditional growth-based, export-led economy, allows for creative experimentation with what is likely to become the major social concern of government – i.e., to address inequality, unemployment, and poor earning capacity – without subordinating the interests of poor and middle-class people to the more affluent. Such subordination causes redistributions that exacerbate the disparity among economic winners and losers, with many people ending up as the losers.

Some of the options have the potential to limit wasteful growth (7, 8, and 9) and underutilize human capital (4, 5, and 6). Some options (1, 2, 3, 4, 5, 6, and 10) require other complementary policies to limit wasteful consumption. What should be evident is that there is no simple solution and that a portfolio of initiatives that target specific problems and reinforce one another is needed.

While some options (2 and 5) may be relatively straightforward to implement, others (1 and 10) may face significant political barriers and may only be viable following a social awakening or global event. What is troubling is that the global financial crisis seems to have been unable to open the door for new, transformative ideas. The pre-crisis financial systems and national approaches to development remain largely intact.

Finally, the actors responsible for implementing each option vary. Governments (1, 2, 3, 4, 5, and 10), national and multinational corporations (3, 4, 5, 6, 7, 10), education/academia (6, 7), and workers (3, 4, 5, and 9) would each need to take lead or supportive roles in realizing a number of the options. Thus, while national governments have the legitimate voice in the international arena, they will need the support of industry, educators, workers, communities, and other entities to advance the full complement of options.

### **13.4 Changes in globalization, trade, and the global financial system**

The interventions discussed in the previous sections will offer some relief from slowing economic growth, destruction of the environment, wage stagnation, and increasing inequality within nations in the developed world, but much more is needed. Changes in globalization, trade, and the global financial system make those interventions difficult.

Furthermore, however daunting the challenges are for developed nations, the large and increasing global problems of economic and political migrants, the disintegration of shared prosperity and contraction in the European Union, belligerence in the Asia-Pacific region and Eastern Europe, resurgence of the global nuclear threat, and the expansion of cultural and religious geopolitical wars in the Middle East form a backdrop of the enormous complexity facing humanity.

Scholars have weighed in on the relative contributions of technological displacement and globalization/trade to employment, wages, and purchasing power. These were addressed in the discussion of “the perfect storm” in Section 0.4 of the Overview. We are persuaded that technological displacement has been the major negative driver since the 1970s and that a resurgence should be expected with the advent of innovation in computer-related technologies and artificial intelligence (captured in the work of Brynjolfsson and McAfee, Autor, and Acemoglu). With the significant reduction of purchasing power among a sizable part of the population, one should not expect developed economies to attain their historical rates of economic growth, and they need to recognize that only a small part of the population will benefit from that growth.

More recently, trade, currency manipulation, and the fault-lines of the global financial system and the Eurozone have been recognized as a major and increasing distortion of future prospects for improvement (see the work of Bivens, Stiglitz, and Varoufakis). Trade practices, in particular, whereby some nations have benefited by not internalizing the real costs of using suboptimal energy and physical and human capital, and through sheer inefficiency in the use of those endowments, have distorted global trading regimes through

both underpricing and through carbon (and environmental) leakage (see Chapter 12). In addition to undervalued currencies and currency manipulation, border tax adjustments in products and services are recognized as long overdue, although importers in developed countries – as well as exporters in emerging economies – would vehemently oppose these measures.

Opposition in both developed and emerging economies is to be found in authoritarian regimes and the economic elites – see Gilens and Page (2014), Piketty (2014), Atkinson (2015), and Stiglitz (2010) – who exercise overwhelming control over political agendas that would otherwise benefit the vast majority of people.

In this work, we have also emphasized the need to “open up the problem and design space” as well as the “political space” to encourage democratic, comprehensive, and integrative solutions to problems. While working at the margins within nations is also important – e.g., reform of the tax treatment of investment, income, and profit; democratic expansion of the ownership of productive capital; environmental initiatives; and labor market reforms – the distortions of globalization, trade, national expenditures for military activities, and the movement of migrants all require that achieving sustainability is much more than a technical, economic, and environmental challenge. It is a political and geopolitical challenge that requires nations to engage fully in reducing global distortions and conflict.

In this work, we have endeavored to bring together the full complement of factors that need to be considered and addressed to transform the industrial state. The complexity of such a transformation will require a systemic and integrated approach to change. We hope this work provides a transdisciplinary framework that indicates where change is needed and how expanding the design *and* political space for integrated solutions can result in revolutionary change towards sustainable development.

### **13.5 Conclusion and reflections on economic growth, credit, environment, employment, trade, and a binary economy**

Since the 1970s, productivity and GDP have grown steadily, but this growth has not been accompanied by growth in income for much of the society, meaning that the wealth created has not accrued to ordinary people. Since the early 2000s, wages as a percentage of GDP have declined, while corporate profits as a percentage of GDP have increased. The usual policy solutions offered to address these trends include (1) more investment in technology and innovation through increased spending, (2) more access to financial credit on the part of both producers and consumers, (3) redistribution of income through more progressive taxation, (4) raising the minimum wage, (5) a shorter workweek with retained income levels to spread out the work and increase labor’s share of profits, (6) designing work back into the production of goods and services, (7) a guaranteed annual income, paying for unpaid work usually performed by women and low-wage workers, and (8) the reform of international trade. See Bivens (2018) for recommendations for creating jobs and economic security in the U.S. addressing some of these policy solutions.

These options are essentially a variant of the current economic–industrial model of “free-market” economies. This model is based on a conventional approach to economic analysis found in various schools of classical, neoclassical, and Keynesian economics. What is missing from this analysis is explicit consideration of the economic consequences of **the distribution of the acquisition (and thereby the ownership) of productive capital** (natural and physical capital, energy, and ICT – what is known as real capital). Although there are major differences among the various economic schools that underlie conventional economic policy, these schools share in common one questionable, unstated assumption: namely, that the distribution of capital acquisition has no substantial market relationship to the distribution of individual earning capacity and economic growth. If this assumption

is false, then the distribution of productivity improvements and profits, and the rate and sustainability of their growth, cannot be adequately addressed without addressing the market distribution of capital acquisition.

Binary economics rests on the observation that (1) real capital and labor are two independent sources of production and earning capacity, (2) although advancing technology may be seen to make labor more productive, it also makes capital more productive than labor in task after task, and (3) the distribution of its acquisition has a substantial impact on the distribution of individual earning capacity and growth.

Contrary to the assumption of the various economic models that view the primary role of real capital as making labor more productive, increased technological replacement of labor by capital means that capital is doing more and more of the work and is responsible for more of the economic growth. Further, in replacing labor, capital is not simply undertaking the *same* amount of work; rather, it is *vastly increasing* the amount of work that can be done. When understood in this way, it becomes clear that those individuals who continually acquire (and thereby own) the growing productive capacity of the economy embodied in the real capital will also enjoy an increasing share of economic growth. Providing poor and middle-class people with a competitive means to acquire capital and thereby earn income from capital would increase their effective demand, which would in turn stimulate future economic growth through their increasing ability to purchase goods and services. This mechanism – known as the principle of binary growth – could encourage firms to increase their productive capacity in the expectation of greater consumer demand, which would further enhance employment opportunities (for both labor and capital).

It is now becoming increasingly clear that the yields of economic activity through industrial investment and innovation are not only benefiting a smaller and smaller group of people, but plateaus are being reached in the productiveness/efficiency of new innovations (see, e.g., the work of Robert Ayres, which has explored the decreasing amount of useful energy – called *exergy* – that can be harnessed from energy sources).

The historical approach to these problems was to provide more credit to producers to enable them to realize riskier gains and more consumer credit to citizens so they can keep up with a previous growth level – a situation which led to the 2008 financial crisis. Degrowth as an intentional strategy is now being discussed in some circles, and it is largely motivated by a concern for environmental impacts and global climate change that are exacerbated by more industrial growth. Responding to the reality of shrinking resources, a popular and growing, if still small, movement towards sustainable production and consumption has also emerged. Of course, both degrowth and reduced consumption challenge the standard economic labor productivity growth model.

Other options that are focused on the redistribution of income, while socially justifiable to many people, are likely to be met with resistance by those who are advantaged by the present arrangements and who have a disproportionate and large impact on the political, industrial, economic, energy, tax, trade, and environmental systems.

Designing work back into the production of goods and services is a technical option that would increase labor intensiveness and share of economic growth, but this runs counter to the wave of enhancing computer applications and artificial intelligence in those activities. It would also require universities to completely transform how they are educating engineering, science, and business graduates, who are challenged to always do more with less, which typically means less labor.

This brings us to the option of broadly distributing the *ownership of productive (real) capital* by leveraging existing corporate finance mechanisms that enable capital to pay for itself with its *future* earnings. The subsequent increase in the effective demand of citizens (as explained above) could stimulate significant future economic growth. Thus, in order not to run into planetary boundaries, growth from those investments financed using the principles of binary economics, like all other growth, will either have to be focused on

much more sustainable (and less) production and consumption, or technical changes have to be made to what is produced and consumed – or both.

Finally, the reform of trade practices, which characteristically do not price the cost of social and environmental externalities, needs serious discussion, no matter what pathway is taken to increase broad-based economic welfare.

### 13.6 References

- Aiginger, K. (2016). “A Strategy Change for Europe: Old Myths Versus New Roads.” *Forum, Intereconomics* 51(1): 28–33.
- Alperovitz, G., G. Speth, and J. Guinan (2015). *The Next System Project: New Political Possibilities for the 21st Century*. NSP Report 1. The Democracy Collaborative. Available at [https://thenextsystem.org/sites/default/files/2017-08/NSPReport1\\_Digital.pdf](https://thenextsystem.org/sites/default/files/2017-08/NSPReport1_Digital.pdf) (accessed April 29, 2018).
- Ashford, N. A., and R. P. Hall (2011a). “The Importance of Regulation-Induced Innovation for Sustainable Development.” *Sustainability* 3: 270–292.
- Ashford, N. A., and R. P. Hall (2011b). *Technology, Globalization, and Sustainable Development: Transforming the Industrial State*. New Haven, Yale University Press.
- Ashford, N. A., R. P. Hall, and R. Ashford (2012a). “Addressing the Crisis in Employment and Consumer Demand: Reconciliation with Environmental and Financial Sustainability.” *The European Financial Review*. 63–68. Available at [www.europeanfinancialreview.com/?p=5884](http://www.europeanfinancialreview.com/?p=5884) (accessed April 29, 2018).
- Ashford, N. A., R. P. Hall, and R. Ashford (2012b). “The Crisis in Employment and Consumer Demand: Reconciliation with Environmental Sustainability.” *Environmental Innovation and Societal Transitions* 2: 1–22, March 2012. Available at [www.sciencedirect.com/science/article/pii/S2210422412000032](http://www.sciencedirect.com/science/article/pii/S2210422412000032) (accessed October 24, 2017).
- Ashford, N. A., and G. Kallis (2013). “A Four-Day Workweek: A Policy for Improving Employment and Environmental Conditions in Europe.” *The European Financial Review* 53–58, April–May 2013. Available at [www.europeanfinancialreview.com/?p=6601](http://www.europeanfinancialreview.com/?p=6601) (accessed October 24, 2017).
- Ashford, N. A., and A. Renda (2016). “Aligning Policies for Low-Carbon System Innovation in Europe.” *Center for European Policy Studies and i24C*. Brussels. Available at [www.ceps.eu/publications/aligning-policies-low-carbon-systemic-innovation-europe](http://www.ceps.eu/publications/aligning-policies-low-carbon-systemic-innovation-europe) (accessed October 24, 2017).
- Ashford, R. (1998). “A New Market Paradigm for Sustainable Growth: Financing Broader Capital Ownership with Louis Kelso’s Binary Economics.” *Praxis: The Fletcher Journal of Development Studies* XIV: 25–59.
- Ashford, R. (2006). “Binary Economics: The Economic Theory That Gave Rise to ESOPs.” *Owners at Work*: 12–14.
- Ashford, R. (2013). “Beyond Austerity and Stimulus: Democratizing Capital Acquisition with the Earnings of Capital as a Means to Sustainable Growth.” *Journal of Post Keynesian Economics* 36: 179–206.
- Ashford, R. (2015). “Unutilized Productive Capacity, Binary Economics and the Case for Broadening Binary Ownership.” *Economics, Management and Financial Markets* 11, June 2015.
- Ashford, R., R. P. Hall, and N. A. Ashford (2012). “Broadening Capital Acquisition with the Earnings of Capital as a Means of Sustainable Growth and Environmental Sustainability.” *The European Financial Review*. 70–74. Available at [www.europeanfinancialreview.com/?p=5984](http://www.europeanfinancialreview.com/?p=5984) (accessed October 24, 2017).
- Ashford, R., and R. Shakespeare (1999). *Binary Economics: The New Paradigm*. Lanham, MD, University Press of America.
- Atkinson, A. B. (2015). *Inequality: What Can Be Done?* Cambridge, Harvard University Press. 384 pages.

- Autor, D., D. Dorn, L. Katz, C. Patterson, and J. van Reenen (2017). “Concentrating on the Falling Labor Share.” *American Economic Review Papers & Proceedings* 107(5): 180–185. Available at <https://www.aeaweb.org/conference/2017/preliminary/paper/Qe85NKaK> (accessed October 24, 2017).
- Ayres, R. U. (2006). “Turning Point: The End of Exponential Growth?” *Technological Forecasting and Social Change* 73: 1188–1203.
- Ayres, R. (2014). *The Bubble Economy: Is Sustainable Growth Possible?* Cambridge, MIT Press.
- Ayres, R. (2015). *The Bubble Economy: Is Sustainable Growth Possible?* Cambridge, MIT Press.
- Ayres, R. (2016). *Energy, Complexity and Wealth Minimization*. Switzerland, Springer International Publishing. 587 pages.
- Ayres, R. U., and B. Warr (2009). *The Economic Growth Engine: How Energy and Work Drive Material Prosperity*. Williston, VT, Edward Elgar Publishing.
- Bengtsson, M., E. Alfredsson, M. Cohen, S. Lorek, and P. Schroeder (2018). “Transforming systems of consumption and production for achieving the sustainable development goals: moving beyond efficiency” *Sustainability Science*: 1–15. Available at: <https://doi.org/10.1007/s11625-018-0582-1> (accessed June 7, 2018).
- Birchall, J. (2003). *Rediscovering the Cooperative Advantage: Poverty Reduction through Self-Help*. Geneva, International Labour Office.
- Bivens, J. (2017). “Adding Insult to Injury: How Bad Policy Decisions Have Amplified Globalization’s Costs for American Workers Report.” *Economic Policy Institute*, July 11. Available at <https://www.epi.org/files/pdf/130569.pdf> (accessed October 24, 2017).
- Bivens, J. (2018). “Recommendations for Creating Jobs and Economic Security in the U.S.: Making Sense of Debates about Full Employment Public Investment, and Public Job Creation.” March 27, 2018. Available at [epi.org/142207](https://www.epi.org/142207) (accessed October 24, 2017).
- Bivens, J., and H. Blair (2016). *Financing Recovery and Fairness by Going Where the Money Is: Progressive Revenue Increases Are Key to Meeting Nation’s Fiscal Challenges Report*. Economic Policy Institute, November 15, 2016. Available at [www.epi.org/115862](https://www.epi.org/115862) (accessed October 24, 2017).
- Blasi, J. R., R. B. Freeman, and D. L. Kruse (2013). *The Citizen’s Share: Putting Ownership Back into Democracy*. New Haven, Yale University Press.
- Borel-Saladin, J. M., and I. N. Turok (2013). “The Green Economy: Incremental Change or Transformation?” *Environmental Policy and Governance* 23(4): 209–220.
- Borzaga, C., R. Bodini, C. Carini, S. Depedri, G. Galera, and G. Salvatori (2014). “Europe in Transition: The Role of Social Cooperatives and Social Enterprises.” *Euricse Working Paper* 69|14.
- Brown, H. (2016). *Is Sustainable Consumption Compatible with Increasing the Income Among the Poor and Middle Class?* Wordpress. Available at <https://wordpress.clarku.edu/hbrown/2016/07/09/is-sustainable-consumption-compatible-with-increasing-the-income-among-the-poor-and-the-middle-class/> (accessed October 24, 2017).
- Brynjolfsson, E., and A. McAfee (2014). *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies*. New York, W. W. Norton & Company.
- CBO (Congressional Budget Office). (2013). *Estimated Impact of the American Recovery and Reinvestment Act on Employment and Economic Output from October 2012 Through December 2012*. Washington, DC, Congressional Budget Office.
- CBO (Congressional Budget Office). (2014). *Estimated Impact of the American Recovery and Reinvestment Act on Employment and Economic Output in 2013*. Washington, DC, Congressional Budget Office.
- Charles, T., and F. Lehner (1998). “Competitiveness and Employment: A Strategic Dilemma for Economic Policy.” *Competition and Change* 3: 207–236.
- Cho, A. (2010). “Three Laureates Explained Why Unemployment Is Inevitable.” *Science* 330: 303.
- Christensen, C. M. (1997). *The Innovator’s Dilemma: When New Technologies Cause Great Firms to Fail*. Cambridge, Harvard Business School Press.

- D'Alisa, D., and G. Kallis (2014). *Degrowth: A Vocabulary for a New Paradigm*. New York, Routledge, Earthscan.
- Dernbach, John C. (2011). "Creating the Law of Environmentally Sustainable Economic Development." *Pace Environmental Law Review (PELR)* 28(3): 614–641.
- Estevão, M., and F. Sá (2008). "The 35-Hour Week." *Economic Policy* 23: 417–463.
- Foray, D. (2006). *The Economics of Knowledge*. Cambridge, MIT Press.
- Galbraith, J. K. (2014). "Capital for the Twenty-First Century?" *Dissent*. Available at <https://www.dissentmagazine.org/article/kapital-for-the-twenty-first-century> (accessed April 29, 2018).
- Gilens, M., and B. I. Page (2014). "Testing Theories of American Politics: Elites, Interest Groups, and Average Citizens." *Perspectives on Politics* 12(3): 564–581. Available at <https://doi.org/10.1017/S1537592714001595> (accessed October 24, 2017).
- Goodwin, N. (2014a). "The Human Element in the New Economics: A 60-Year Refresh for Economic Thinking and Teaching." *Real-World Economics Review* 68, August 2014. Available at [www.ase.tufts.edu/gdae/Pubs/te/GoodwinRealWorldEconReviewAug2014.pdf](http://www.ase.tufts.edu/gdae/Pubs/te/GoodwinRealWorldEconReviewAug2014.pdf) (accessed October 24, 2017).
- Goodwin, N. (2014b). "Prices and Work in the New Economy." GDAE Working Papers 14-01, GDAE, Tufts University. Available at [www.ase.tufts.edu/gdae/Pubs/wp/14-01GoodwinPricesWork.pdf](http://www.ase.tufts.edu/gdae/Pubs/wp/14-01GoodwinPricesWork.pdf) (accessed October 24, 2017).
- Goodwin, N. (2017). "Core Support for the New Economy." *Interdisciplinary Journal of Partnership* 4(1). Available at <https://doi.org/10.24926/ijps.v4i1.153>
- Hall, R. P., S. Ranganathan, and G. C. Raj (2017). "A General Micro-Level Modeling Approach to Analyzing Interconnected SDGs: Achieving SDG 6 and More Through Multiple-Use Water Services (MUS)." *Sustainability* 9(2): 314.
- Hayden, A. (2006). "France's 35-Hour Week: Attack on Business? Win–Win Reform? Or Betrayal of Disadvantaged Workers?" *Politics & Society* 34: 503–542.
- Hoffman, E. A. (2012). *Co-operative Workplace Dispute Resolution: Organizational Structure, Ownership, and Ideology*. Burlington, Ashgate Publishing.
- Hoffmann, U. (2011). *Some Reflections on Climate Change, Green Growth Illusions, and Development Space*. No. 205. New York, United Nations Conference on Trade and Development (UNCTAD).
- Jackson, T. (2009). *Prosperity Without Growth*. London and Sterling, VA, Earthscan.
- Jackson, T., and P. Victor (2011). "Productivity and Work in the 'Green Economy': Some Theoretical Reflections and Empirical Tests." *Environmental Innovation and Societal Transitions* 101–108.
- Jackson, T., and P. Victor (2013). *Green Economy and Community Scale*, Spring 2011, Widener Law School Legal Studies Research Paper No. 3 Metcalf Foundation November 2013.
- Kleinknecht, A. (1998). "Is Labour Market Flexibility Harmful to Innovation?" *Cambridge Journal of Economics* 22(3): 387–396.
- Kleinknecht, A. (2015). "How 'Structural Reforms' of Labour Markets Harm Innovation." Research Paper No. 6 (July 2015). Available at [www.socialeurope.eu/#ios](http://www.socialeurope.eu/#ios), [www.socialeurope.eu/wp-content/uploads/2015/07/RE6-Kleinknecht.pdf](http://www.socialeurope.eu/wp-content/uploads/2015/07/RE6-Kleinknecht.pdf) (accessed October 24, 2017).
- Kallis, G. (2011). "In Defence of Degrowth." *Ecological Economics* 70(5): 873–880.
- Kallis, G., M. Kalush, H. O'Flynn, J. Rossiter, and N. Ashford (2013). "'Friday Off': Reducing Working Hours in Europe." *Sustainability* 4(5): 1545–1567. Available at <http://www.mdpi.com/2071-1050/5/4/1545> (accessed October 24, 2017).
- Kaswan, M. J. (2014). *Happiness, Democracy, and the Cooperative Movement: The Radical Utilitarianism of William Thompson*. Albany, State University of New York Press.
- Keen, S. (2016). *Developing an economics for the post-crisis world*. London, College Publications.
- Keen, S. (2017). *Can we avoid another financial crisis?* Cambridge, Polity.
- Kelly, M. (2012). *Owning Our Future: The Emerging Ownership Revolution*. San Francisco, Barrett-Koehler.
- Krugman, P. (2007). *The Conscience of a Liberal*. New York, W. W. Norton & Company.

- Kulish, N. (2010). "Defying Others, Germany Finds Economic Success." *New York Times*, August 14, 2010.
- Lorek, S., and J. Spangenberg (2013). "Sustainable Consumption Within a Sustainable Economy – Beyond Green Growth and Green Economies." *Journal of Cleaner Production* 63: 33–44.
- Mont, O., and A. Tukker (2006). "Product–Service Systems: Reviewing Achievements and Refining the Research Agenda." *Journal of Cleaner Production* 14: 1451–1454.
- Perez, C. (2016). "Capitalism, Technology and a Green Global Age: The Role of History in Helping to Shape the Future." *Rethinking Capitalism: Economics and Policy for Sustainable Development and Inclusive Growth*. M. Jacobs and M. Mazzucato and Jacobs: 191–217. Chichester, West Sussex, Wiley-Blackwell. Available at [www.youtube.com/watch?v=Do-dvqRSbp4](http://www.youtube.com/watch?v=Do-dvqRSbp4) (accessed October 24, 2017) for a presentation of these views in 2017 at 16 minutes to 40:45 minutes. See also slides at [www.carlotaperez.org/downloads/media/PEREZ%20launch%20of%20MJ-MM%20book%20Rethinking%20Ksm%20final.pdf](http://www.carlotaperez.org/downloads/media/PEREZ%20launch%20of%20MJ-MM%20book%20Rethinking%20Ksm%20final.pdf) (accessed October 24, 2017).
- Piketty, T. (2014). *Capital in the Twenty-First Century*. Cambridge, MA, The Belknap Press of Harvard University Press. 704 pages.
- Pollin, R., H. Garrett-Peltier, J. Heintz, and H. Scharber (2008). *Green Recovery: A Program to Create Good Jobs and Start Building a Low-Carbon Economy*. Washington, DC, Center for American Progress.
- Prasad, N. (2008). *Policies for Redistribution: The Uses of Taxes and Social Transfers*. Geneva, International Institute for Labour Studies, Discussion Paper 194 International Labour Organisation.
- Quarter, J., L. Mook, and A. Armstrong (2009). *Understanding the Social Economy: A Canadian Perspective*. Toronto, University of Toronto Press.
- Romer, D. H. (2011). "What Have We Learned About Fiscal Policy from the Crisis?" Paper presented at the IMF Conference on Macro and Growth Policies in the Wake of the Crisis, March.
- Rothschild, J., and J. A. Whitt (1986). *The Cooperative Workplace: Potentials and Dilemmas of Organizational Democracy and Participation*. Cambridge, Cambridge University Press.
- Rothschild, J., and A. Tomchin (2005). "Can Collectivist-Democracy Bring Gender Equality? The Efforts at Twin Oaks." *Research in the Sociology of Work* 16: 239–262.
- Rowland, W. (1973). *The Plot to Save the World*. Toronto and Vancouver, Clarke, Irwin, & Company Ltd.
- Sanders, R. (2006). "Sustainability: Implications for Growth, Consumption, and Employment." *International Journal Environment, Workplace and Employment* 2(4): 385–401.
- Saunders, H. (2016). *Does Capitalism Require Endless Growth? Marx and Malthus Reconsidered*. The Breakthrough Institute, Summer 2016. Available at <https://thebreakthrough.org/index.php/journal/past-issues/issue-6/does-capitalism-require-endless-growth> (accessed October 24, 2017).
- Schoening, J. (2005). "Cooperative Entrepreneurialism: Reconciling Democratic Values with Business Demands at a Worker-Owned Firm." *Research in the Sociology of Work* 16: 293–315.
- Schor, J. B. (2010). *Penitence: The New Economics of True Wealth*. New York, Penguin.
- Spangenberg, J. H. (2007). "Defining Sustainable Growth: The Inequality of Sustainability and its Applications." *Frontiers in Ecology Research*. S. D. Antonello. New York; Nova Science Publishers: 141–163.
- Speth, J. G. (2008). *The Bridge at the Edge of the World: Capitalism, the Environment, and Crossing from Crisis to Sustainability*. New Haven, Yale University Press.
- Speth, J. G. (2010a). "Letter to Liberals: Liberalism, Environmentalism, and Economic Growth." 13th Annual E. F. Schumacher Lectures, New York City, November 20, 2010.
- Speth, J. G. (2010b). "A New Environmentalism and the New Economy." The 10th Annual John H. Chafee Memorial Lecture, National Council for Science and the Environment, Washington, DC, January 21, 2010.

- Speth, J. G. (2010c). "Towards a New Economy and a New Politics." *Solutions* 1(5): 33–41. Available at <https://www.thesolutionsjournal.com/article/towards-a-new-economy-and-a-new-politics/> (accessed April 29, 2018).
- Stiglitz, J. (2010). *Freefall: America, Free Markets, and the Sinking of the World Economy*. New York, W. W. Norton & Company. 361 pages.
- Stiglitz, J. (2015). "Rewriting the Rules for the American Economy: An Agenda for Growth and Shared Prosperity." A Report of the Roosevelt Institute.
- Stiglitz, J. (2016). *Stiglitz Says Standard Economics Is Wrong: Inequality and Unearned Income Kill the Economy*. Available at <http://economics.com/joseph-stiglitz-inequality-unearned-income/> (accessed October 24, 2017).
- Surowiecki, J. (2014). "Companies with Benefits." *The New Yorker*, August 4, 2014.
- Tukker, A., and U. Tischner (2006). *New Business for Old Europe: Product–Service Development, Competitiveness and Sustainability*. Sheffield, Greenleaf Publishing.
- Ummel, K. (2014). *Who Pollutes? A Household-Level Database of America's Greenhouse Gas Footprint*. Center for Global Development Working Paper No. 381. Available at <https://www.cgdev.org/sites/default/files/who-pollutes-database-greenhouse-gas-footprint.pdf> (accessed October 24, 2017).
- Varoufakis, Y. (2011). *The Global Minotaur*. London, Zed Books.
- Vivarelli, M., and M. Pianta (2000). *The Employment Impact of Innovation: Evidence and Policy*. London, Routledge.

