Raskin, P., T. Banuri, G. Gallopin, P. Gutman, A. Hammond, R. W. Kates, and R. Swart, 2002, Great Transition: The Promise and Lure of the Times Ahead. Stockholm Environment Institute.

4. *How Do We Get There?*

*H*ow can we navigate the planetary transition toward a sustainable and desirable global society? *Market Forces* could shipwreck on the shoals of environmental and social crises, and risk sinking into the barbarism of a *Fortress World*. The *Policy Reform* vision would steer toward sustainability with programs for improving technology and reducing poverty, but the momentum of global economic growth could swamp incremental adjustments. And if consumer culture prevails, where would vision and political leadership come from? We must look to more fundamental course changes to guarantee safe passage.

Strategies

The *Great Transitions* approach to a sustainable civilization builds on the wealth-generating features of *Market Forces* and the technological change of *Policy Reform*. But it transcends them by recognizing that market-led adaptations and government-led policy adjustments are not enough. *Great Transitions* adds a third ingredient—a values-led shift toward an alternative global vision. Powerful additional opportunities for mending the global environment and forging more harmonious social conditions would then open. The new development paradigm would include lifestyle changes and greater social solidarity. The distinctions between *Market Forces*, *Policy Reform* and *Great Transitions* visions are illustrated in Figure 8.

    Market Forces maintains the conventional correlation of human well-being and the level of consumption, with material consumption, in turn, driving greater throughput of natural resources and impact on the environment. In the *Policy Reform* strategy, the link between well-being and consumption is maintained, but consumption is decoupled from throughput (the "dematerialization wedge"). *Great Transitions* adds a second "lifestyle wedge" that breaks the lockstep connection between consumption and well-being. Environmental

Figure 8. Tools for a Transition
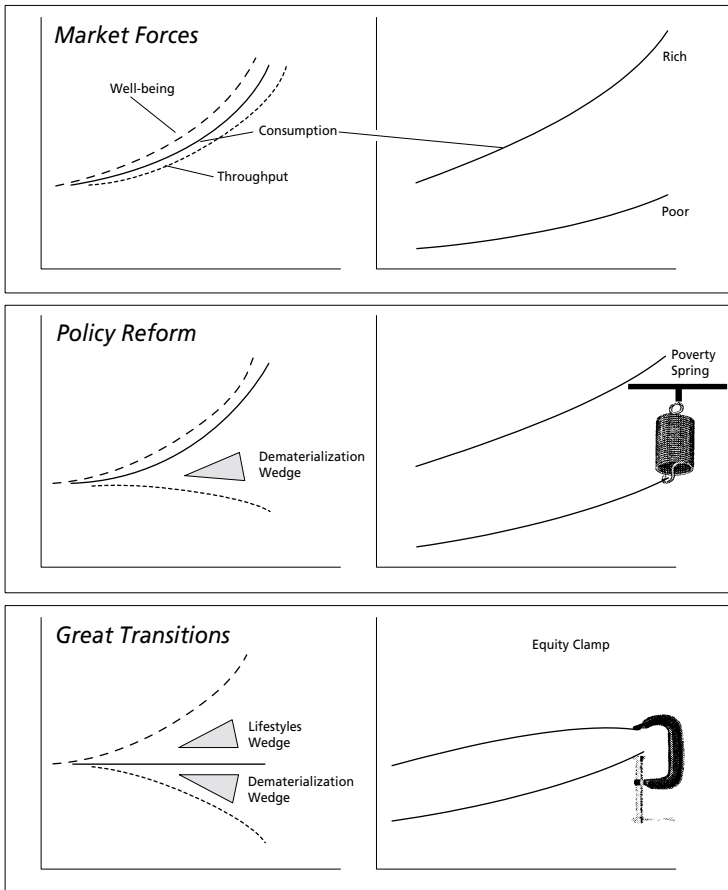
Source: "Wedges" based on Robinson and Tinker (1996)

impacts may be decomposed into the product of human activity—miles driven, steel produced, food harvested and so on—and impact per activity. *Policy Reform* focuses on the second factor, introducing efficient, clean and renewable technologies that reduce impacts per activity. *Great Transitions* complements such technology improvements with lifestyles and values changes that reduce and change activity levels in affluent areas, and provide an alternative vision of development globally.

A second critical distinction between the scenarios concerns equity, as illustrated in the right-hand column of sketches in Figure 8. In the *Market Forces* world, the economic growth of the poorer regions of the world is more rapid than the rich regions, but, nevertheless, the absolute difference between rich and poor widens. At the bottom of the income pyramid, a billion people remain mired in absolute poverty. *Policy Reform* strategies substantially reduce absolute poverty through targeted aid and livelihood programs (the "poverty spring"). While the yawning gap between rich and poor is partially abated, global and national inequity remains a threat to social cohesion. Poverty eradication is a fundamental tenet of *Great Transitions*, as well. But in addition to pulling up the bottom, great value is placed on urgently creating more just, harmonious and equitable social relations (the "equity clamp").

Conventional Worlds strategies operate on the direct levers of change that can influence economic patterns, technology, demographics and institutions. Mainstream development policy focuses on these proximate drivers. A *Great Transition* would go deeper to the root causes that shape society and the human experience. These ultimate drivers include values, understanding, power and culture (Figure 9). Proximate drivers are responsive to short-term intervention. The more stable ultimate drivers are subject to gradual cultural and political processes. They define the boundaries for change and the future. The *Great Transition* project would expand the frontier of the possible by altering the basis for human choice.

Change Agents

All global visions inevitably confront the question of agency: Who will change the world? The agents driving the *Market Forces* scenario are global corporations, market-enabling governments and a consumerist public. In *Policy Reform*, the private sector and consumerism remain central, but government takes the lead in aligning markets with environmental and social goals. Civil society and engaged citizens become critical sources of change for the new values of *Great Transitions*.

Figure 9. Proximate and Ultimate Drivers
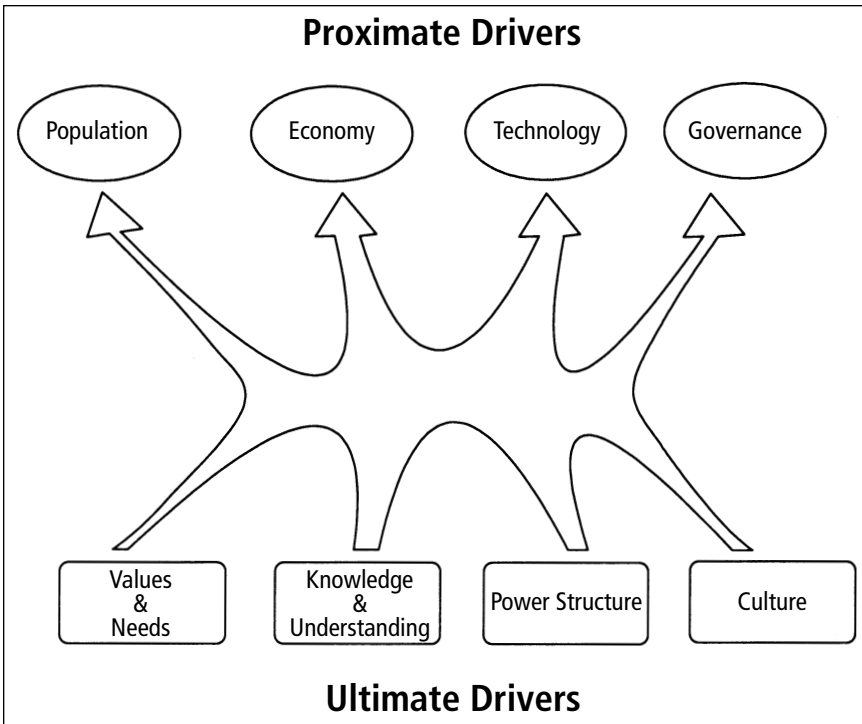
In truth, all social actors shape—and are shaped by—world development. The play is difficult to distinguish from the players. The prospects for a *Great Transition* depend on the adaptations of all institutions—government, labor, business, education, media and civil society. But three emerging global actors—intergovernmental organizations, transnational corporations and non-governmental organizations—move to center stage. The fourth essential agency is less tangible—public awareness and values, especially as manifested in youth culture. Meanwhile, other powerful global players—criminal organizations, terrorist rings and special interest groups—lurk in the wings, threatening to steal the show.

The formation of global and regional intergovernmental organizations has tracked the emergence of the Planetary Phase. The United Nations, in particular, embodies the hope that world peace, human rights and sustainable development might rise from the

destruction and suffering of the twentieth-century. But the UN has not been given the authority to fulfill that lofty mission, its effectiveness compromised by the politics of its member nation-states. Still, it remains the legitimate collective voice of the world's governments.

That voice would differ across scenarios. In a *Market Forces* world, power moves to the private sector, international banks and the WTO—the UN is largely a toothless platform for international conferences, high-minded rhetoric and crisis management. But in *Policy Reform*, the UN becomes a key venue for implementing environmental and social goals. In *Barbarization* scenarios, the UN is relevant only to historians. In a *Great Transition*, a reorganized UN expresses the international solidarity of the new development agenda as the dominance of the nation-state fades.

To a great extent, the evolution of intergovernmental entities will reflect the political imperatives of the ascendant global system. The ultimate source of the value changes and political choices for a *Great Transition* lie elsewhere. But the UN and the others are not simply dependent variables in the calculus of global change; at critical moments they can provide leadership and initiative for the transition, as well.

The scale, market reach and political might of transnational corporations have soared since World War II. The power of transnational corporations continues to grow in *Market Forces*. *Policy Reform* requires their support, or at least acquiescence; big business comes to understand sustainable development as a necessary condition for preserving the stability of world markets. The *Great Transition* process transforms the role of business. As the new values spread among the consuming public, forward-looking corporations seize the new reality as a business opportunity and a matter of social responsibility. In partnership with government and citizens' groups they establish tough standards for sustainable businesses and innovative practices to meet them.

To some degree, business can drive progressive change. Many win-win opportunities are available for bringing the corporate bottom line of profit into harmony with the societal bottom line of sustainable development. Most directly, good environmental

management at facilities can reduce the costs and risks of doing business. In addition, some companies can expand their market share by projecting an image of corporate responsibility. Some business visionaries advocate sustainability as both a business and moral imperative. But the aggregation of these adjustments does not guarantee a transition, nor are business-initiated changes likely to maintain momentum when economic conditions turn sour or the public's interest in sustainability wanes. Nevertheless, sustainability-oriented businesses are an important part of the dynamic of change as they constructively respond to, and reinforce, new pressures from consumers, regulators and the public.

Non-governmental organizations—the organizational expression of civil society—are critical new social actors in global, regional and local arenas (Florini, 2000). The explosive growth in the number and diversity of NGOs has altered the political and cultural landscape. They use modern communications technology to build public awareness and mount campaigns to influence policy and alter corporate behavior. At official international meetings, some are inside the building as active participants, and some are in the streets, challenging the drift of globalization and, in some cases, globalization itself. They are for the most part positive forces for fostering debate and progressive change. But on the dark side, it must be noted, are organizations of terrorists and criminals—perverse forms of NGOs that also use modern information technology, but to spread violence, hate and fear.

NGO success stories include micro credit, social forestry, environmental advocacy, community development and appropriate technology programs. These activities enable communities to participate more effectively in economic and social decisions, and give poor populations access to skills and financial resources. They influence business practices through monitoring, direct action and boycotts. They promote alternative lifestyles. More recently, global public policy networks have begun to link individuals and organizations from multiple countries and stakeholder groups. These networks engage in research, public outreach, advocacy and organized protest on a range of sustainability issues (Reinicke et al., 2000; Banuri et al., 2001).

In doing all this, civil society organizations fill major gaps in public policy-making. By harnessing expert opinion from a diverse set of viewpoints, they have helped create capacity to analyze and respond to emerging problems. By mobilizing stakeholder groups and by refining participatory methodologies, they have helped create channels of public participation. By increasing public awareness, they have fostered transparency in decision-making. Finally, and most importantly, they have injected ethical and normative voices into the political arena.

Like all social actors, civil society is a phenomenon in flux, transformed by the very processes of global change it seeks to influence. Unleashing wellsprings of energy and activism, the new civil society is beginning to discover itself as a globally connected force for change, experimenting with different forms of alliance and networking. Yet, as a global movement, it remains fragmented and responsive, lacking a cohesive positive social vision and coherent strategy.

A critical uncertainty for a *Great Transition* is whether civil society can unify into a coherent force for redirecting global development. This would require a coalescence of seemingly unrelated bottom-up initiatives and diverse global initiatives into a joint project for change. Such a force would entail a common framework of broad principles based on shared values fostered through the activities of educational, spiritual and scientific communities.

Intergovernmental organizations, transnational corporations and civil society are key global actors. The underlying engine of a *Great Transition*, however, is an engaged and aware public, animated by a new suite of values that emphasizes quality of life, human solidarity and environmental sustainability. In this regard, the international youth culture will be a major force for change, albeit a diffuse one. Connected by the styles and attitudes spread by media, global youth represent a huge demographic cohort whose values and behaviors will influence the culture of the future. If they evolve toward consumerism, individualism and nihilism, the prospects would not be promising. But as globalization and its problems mature, the world's youth could rediscover idealism in a common project to forge a *Great Transition*.

Finally, it should be noted that some see technology, rather than social agents, as the primary driver of change. Optimists celebrate the potential for information technology, biotechnology and artificial intelligence to entrain a broad web of favorable societal transformation. Pessimists warn of a dehumanized digital, robotic and bio-engineered society. But all scenarios—*Market Forces*, *Policy Reform*, *Great Transitions* and even *Fortress World*—are compatible with the continuing technological revolution. Technology is not an autonomous force. The agenda, pace and purpose of innovation is shaped by the institutions, power structure and choices of society.

To envision a *Great Transition* is to imagine the continued evolution of civil society organizations toward formalization and legitimacy, new roles for business and government and, especially, new values and participation by global citizens. With no blueprint, this will be a long project of social learning and discovery, a process of experimentation and adaptation (BSD, 1998). Where political will is lacking, *civil will* drives the transition forward. The question is whether change agents will remain fractional and fragmented, or whether they will expand and unify to realize the historic potential for transformation. If the many voices form a global chorus, it will herald a new sustainability paradigm. The story of change in a *Great Transition* is a tale of how the various actors work in synergy and with foresight as collective agents for a new paradigm.

Dimensions of Transition

A *Great Transition* envisions a profound change in the character of civilization in response to planetary challenges. Transitions have happened before at critical moments in history, such as the rise of cities thousands of years ago and the modern era of the last millennium. All components of culture change in the context of a holistic shift in the structure of society and its relation to nature. The transition of the whole social system entrains a set of sub-transitions that transform values and knowledge, demography and social relations, economic and governance institutions, and technology and the environment (Speth, 1992). These dimensions reinforce and amplify one another in an accelerating process of transformation.

Values and Knowledge

Prevailing values set the criteria for what is considered good, true and beautiful. They delineate what people want and how they want to live. Values are culturally conditioned, reflecting the social consensus on what is considered normal or desirable. Depending on its dominant values, a society lies along a continuum between antagonism and tolerance, individualism and solidarity, and materialism and a concern for deeper meaning. Individualism and consumerism drive the unsustainable trends of *Conventional Worlds*. But they are neither inherent nor inevitable. The plausibility of a *Great Transition* rests with the possibility that an alternative suite of values emerges to underpin global development.

The distinction between "needs" and "wants" has profound implications for the transition. Physiological, psychological and social needs are universal, but culture shapes how they are perceived and how they are expressed as wants (Maslow, 1954). Advertising and media can stimulate new wants and the experience of them as felt needs. Values mediate how needs are transformed into wants and how they are satisfied. The need for sustenance can be satisfied by steak or vegetables. The need for self-esteem can be satisfied by a luxury car or a circle of friends. A value transition to post-consumerism, social solidarity and ecology would alter wants, ways of life and behaviors.

A complex set of factors drives the search for new values. Both angst and desire—the concern about the future and its lure—play roles. Anxiety over ecological and social crises leads people to challenge received values. This is the "push" of necessity (Table 3). At the same time, visions of a more harmonious world and richer lives attract people toward the new paradigm—the "pull" of desire. Together they lead to a revised notion of wealth that underscores fulfillment, solidarity and sustainability.

Individualism, consumerism and accumulation may help the market reach its full potential. But as dominant values in the Planetary Phase, they are shackles on the possibility of humanity reaching its full potential. On the path to a *Great Transition*, awareness of the connectedness of human beings to one another, to the wider

Table 3. Pushes and Pulls Toward a New Paradigm

Pushes	Pulls
Anxiety about the future	Promise of security and solidarity
Concern that policy adjustments are insufficient to avoid crises	Ethics of taking responsibility for others, nature and the future
Fear of loss of freedom and choice	Participation in community, political and cultural life
Alienation from dominant culture	Pursuit of meaning and purpose
Stressful lifestyles	Time for personal endeavors and stronger connection to nature

community of life and to the future is the conceptual framework for a new ethic (ECI, 2000). Taking responsibility for the well-being of others, nature and future generations is the basis for action.

The knowledge transition would expand the ways in which problems are defined and solved. The fundamental units of analysis of a new sustainability science are socio-ecological systems, as they form and interact from the community to planetary levels. These are complex and non-linear systems with long time lags between actions and their consequences. A systemic framework is required to illuminate key problems such as the vulnerability of systems to abrupt change and interactions across spatial scales. Sustainability research defines a fascinating new program of scientific research. It also is the basis for an early warning system that can alert decision-makers and the public on future perils and provide guidance on ways to respond.

The linkages between human and biophysical systems require the unification of knowledge. The reduction of whole systems to their constituent components was an important methodological advance of the scientific revolution. The division into separate disciplines of inquiry was essential for focus and rigor. These are necessary for addressing the complex problems of transition—but they are insufficient. An interdisciplinary focus on holistic models must now complement the reductionist program.

The challenge is to develop appropriate methodologies, train a new cadre of sustainability professionals and build institutional

capacity. A science of sustainability would highlight integration, uncertainty and the normative content of socio-ecological problems (Kates et al., 2001). Sustainability science proceeds along parallel lines of analysis, action, participation, policy and monitoring in an adaptive real-world experiment. To be trustworthy, knowledge must be rooted in scientific rigor. To be trusted, it must reflect social understanding. The peculiar nature of sustainability problems requires that diverse perspectives and goals be brought to the scientific process. This requires the cooperation of scientists and stakeholders, the incorporation of relevant traditional knowledge, and the free diffusion of information.

For all this to happen, research and educational institutions will need to encourage, support and professionally reward this type of research. The institutional basis for a knowledge transition must be constructed, especially in developing countries. In this regard, information technology offers unprecedented opportunity to provide universal access to data systems, analytic tools and scientific findings. Scientists, policy makers and citizens can interact through networks of research and exchange. The democratization of knowledge would empower people and organizations everywhere to participate constructively in the coming debate on development, environment and the future.

Demography and Social Change

People, their settlements and their social relationships are undergoing rapid and profound change. Growing populations, expanding cities, a continuing rights revolution and globalization are critical demographic and social trends. These will play out differently in the various scenarios of global development. A demographic and social transition is a critical aspect of the wider enterprise of a *Great Transition*.

Cresting populations and reinventing cities Population growth is slowing. The world population of over 6 billion people is growing at an annual rate of 1.3 percent, adding about 80 million people each year. The peak growth rate of about 2.2 percent occurred in the early 1960s and the peak population increase of about 87 million per year occurred in the late 1980s. Under mid-range

assumptions for changes in birth and death rates, population is projected to be over nine billion in 2050 (UNPD, 2001), with almost all of the increase in developing countries.

The acceleration of population stabilization is both an end for, and means to, a *Great Transition*. As an end, decreased birth and death rates can enhance life quality—for children, increased survival, growth and development; for their mothers, lower mortality and greater opportunity for education, work and income; for their fathers, healthier living; and for their grandparents, a longer life. At the same time, the family, the oldest of institutions, is challenged to redefine itself, as siblings diminish and parents age. As a means, a *Great Transition* becomes more feasible in a lower population world. Fewer people would reduce pressure on the environment and reduce the ranks of the impoverished.

The value and social policy changes on the path to a *Great Transition* could decrease projected populations by a billion people by 2050. This would result from satisfying the unmet need for contraception and from parents opting for smaller families and postponing parenting. A key is to join reproductive health services in developing countries with education, particularly for girls, and job opportunities for using their training.

The number of city dwellers has grown much faster than population, with over half the population now urban. If trends continue, the urban share of population could grow to as much as 75 percent by 2050, swelling cities by nearly four billion people, or the equivalent of 400 cities the size of Buenos Aires, Delhi, or Osaka. On average, people who live in urban areas receive more income, have fewer children, have better access to education and live longer than their rural counterparts. But cities are also places of extreme contrast in wealth and opportunity. For the poor of many cities, urban life is more difficult and less healthy than life in the countryside.

The challenge that faces the planners, designers, builders and financiers of expanding cities is also an opportunity. The urban transition is about creating urban settlements that make efficient use of land and infrastructure, and require less material and energy, while providing decent living conditions. The new vision would unify concerns

with habitability, efficiency and environment, concerns that are currently fragmented in different agencies and disciplines. Then, the need to replace much of the current infrastructure over the next two generations could become an opportunity to create habitable cities that are resource efficient and ecosystem conserving.

The transition to sustainable urban environments is an immense challenge. The magnitude of the task would be abated to the degree that the demographic transition reduces overall population. Also, a *Great Transition* could diminish urbanization rates by developing more attractive rural alternatives. Communication and information technology would create more flexible options for remote work, reducing the growth of cities. Urban and town settlement patterns that place home, work, commerce and leisure activity in closer proximity would reduce automobile dependence and strengthen communities. The elimination of the urban underclass, and the strengthening of social cohesion would support the transition to diverse, secure and sustainable communities.

Institutionalizing the rights revolution   The last quarter century witnessed remarkable progress toward a consensus on universal rights for people, children, indigenous cultures and nature. These rights protect civilians caught in civil and international conflict, prohibit genocide and torture, forbid hunger as an instrument of war or repression, provide refuge for abused women, proscribe child exploitation, protect endangered species and affirm diversity in both nature and society.

Rights are expressed through international agreements and administered through new institutions. But their enforcement is far from complete. The transition envisions the acceleration of that process—the institutionalization of inviolable rights of people and of nature. One task is to build popular awareness of established rights and to enforce those rights. Another is to expand them through the extension of freedom and democracy.

But rights are often in conflict. The challenge is to respect minority rights, while avoiding fragmentation into separate identities, territories or even species. Armed conflict will not be reduced

unless alternative ways of providing ethnic or religious autonomy without fragmentation are developed and widely accepted. Life-support systems will not be preserved without well-recognized rights for nature that go beyond single favored species preservation to embrace natural communities and ecosystems.

The eradication of cruelty toward humans will not be served by condoning cruelty toward animals. The *Great Transition* is a human event and humans are at its center. Meeting human needs or extending life quality inevitably involves finding the balance between the use of domesticated and experimental animals and the universal rights of sentient creatures. Rights in conflict are among the most difficult but meaningful challenges. Over time, humankind learns how to extend rights, resolve some conflicts and live in peace with the remainder.

Poverty and equity   Currently the global economy has a dual character. A dynamic, modern, formal component coexists with a rural, informal livelihood economy. The income of the richest 1 percent of the world's people equals that of the poorest 57 percent, while nearly three billion people live on less than $2 per day (UNDP, 2001). Globalization would threaten further marginalization if local economies are subject to the imperatives of global markets with little commitment to place or people. In that kind of globalization, the egalitarian and democratic aspirations of the modern era would remain unfulfilled.

The social transition would focus on the well-being of the poor, sustainable livelihoods and greater equity. The foundation for a *Great Transition* is a world where human deprivation is vanishing and extremes of wealth are moderating. Then the promise of the twentieth century for universal access to freedom, respect and decent lives may be fulfilled in the twenty-first. As new values and priorities reduce the schism between the included and excluded, the space opens for solidarity and peace to flourish. Poverty reduction and greater equity would feed back to amplify the process of transition.

Economy and Governance
A *Great Transition* implies a revision in human institutions—the relationships and patterns that organize the behavior of a society.

Institutional change would both drive and respond to parallel evolution in values, knowledge and ways of life. Critical to this process would be the changing character of the economy and governance.

Contours of a new economy The economic transition means moving towards a system of production, distribution and decision-making that is harmonized with equity, sustainability and human fulfillment. It would balance multiple objectives: eradicating human deprivation, reducing inequality, staying within environmental carrying capacity, and maintaining innovation. This would certainly include such policy instruments as eco-taxes, social subsidies and green accounting. But these would be manifestations of deep processes that reorient the way the economy functions. The economy becomes a means of serving people and preserving nature, rather than an end in itself. The transition would be expressed in altered behaviors and practices of people, firms, governments and international governance systems.

As people aspire to sustainable living, purchasing patterns would reflect ecological sensitivity, consumerism would abate and travel patterns would shift toward mass transport. People might increasingly share their time, through voluntary and non-profit work, and their income, through voluntary donations and support for redistribution through taxation. As affluent countries reduce their environmental footprint, resources would be freed for others.

The changes in consumption patterns would send powerful market signals. The self-interest of business remains an important economic engine, but business interests, too, change. Enlightened businesses would increasingly seize the initiative, showing that eco-efficiency, green marketing and social responsibility offer a competitive advantage. Corporations that pursue new codes of conduct would be rewarded in the market place, while those that do not would be punished by an increasingly informed and vigilant public mobilized by NGOs.

In the course of transition, business would gradually revise the bottom-line to include social equity and environmental sustainability, not only as means to profit, but also as ends. Big corporations would play a leading role in this transformation as their huge technical and

financial resources provide space for strategic innovation. But with their human links and local roots, small businesses also would be important players.

While substantial investment in environmental and social goals would be required, the world economy has the resources for such an undertaking. Moreover, the transition would mobilize "new dividends." A *green dividend* would flow from the cost-savings of eco-efficient corporations and the maintenance of society's environmental capital. A *peace dividend* would stem from gradual reduction of the world's $700 billion annual military expenditure to a sufficient level for world peace-keeping, perhaps $30 billion (Renner, 1994). A *human capital dividend* would come from harvesting the creativity and contributions of the billions who would otherwise be consigned to poverty. A *technological dividend* would derive from new opportunities for innovation and wider access to the information revolution. A *solidarity dividend* arises from reduced security and police costs.

The economic transition is a matter of will, not resources. If values and priorities were to change, economic resources are at hand.

New institutions   The governance transition is about building institutions to advance the new sustainability paradigm through partnerships between diverse stakeholders and polities at local, national and global levels. While specific structures will remain a matter of adaptation and debate, a proliferation of new forms of participation can be expected to complement and challenge the traditional governmental system. In the new paradigm, the state is embedded in civil society and the nation is embedded in planetary society. The market is a social institution to be harnessed by society for ecology and equity, not simply wealth generation. The individual is the locus of a web of social relationships, not simply an atom of pain and pleasure.

Expansion of individual or household entitlements would address social equity. For example, a minimum basic income could be guaranteed to all, possibly through the mechanism of a negative

income tax. This would both reduce poverty and advance gender equality by increasing the economic independence of women. A guaranteed income would indirectly benefit the environment, as well, by reducing the incentive to combat unemployment and poverty through greater economic growth (Van Parijs, 2000). At the other end of the income distribution, progressive taxation would limit individual income and wealth to what *Great Transition* societies find acceptable based on equity and sustainability considerations.

Market regulations would ensure that market forces do not violate social and environmental goals. They would rely on self-regulation by socially and environmentally conscious producers, public pressure, and local, regional, national and international agreements. An empowered and information-savvy network of NGOs, issue-based associations and green producers would reduce the need for government regulation and enforcement.

Income transfers from urban to rural populations could pay for the nature conservation services that the latter perform, such as the European Union policy of paying farmers to maintain rural landscapes. In the transition, analogous mechanisms could transfer resources from rich cities to poor rural areas to simultaneously reduce poverty and secure the provision of ecosystem services such as biodiversity, forest and water conservation, and carbon sequestration.

New roles would evolve for national government in response to pressures coming from all directions. From below, responsibilities would move to local levels in the spirit of subsidiarity and particpation. From above, the expanding needs for global governance would move greater decision-making to the international context. From the side, businesses and civil society would become more active partners in governance. That said, national governments would retain considerable authority, not the least of which would be playing a central role in brokering societal agreements. They would need to do so in ways that are transparent, accountable and democratic.

International negotiation and regulation would grow in importance, since economic, environmental and social issues are increasingly of a global character. These enlarged processes would

set and enforce minimum sustainability standards such as basic human entitlements, environmental resource protection and human rights. The strategies for implementing such standards would be left to national and sub-national deliberations, and would take diverse forms depending on political cultures. In addition to formal governmental processes, international discussions and agreements would involve business groups, consumers' associations and other global networks.

The global information revolution would spawn new international experiments to reshape corporate governance. This would include collaborative processes of corporations, governments, NGOs and grassroots organizations. Current initiatives offer a glimpse of new approaches for increasing transparency and accountability, and aligning business practices with sustainability principles that are appropriate to a planetary society.

Key elements for reducing poverty would be egalitarian policies for wealth redistribution and targeted social expenditures for the poor. In addition to macro-policies, civil society programs would work from the bottom up to address poverty from the perspective of the poor themselves. The goal would be to enhance the individual and collective capacity of the poor to cope with their situation. They would channel resources back to the livelihood economy through collective institutions, financial systems and appropriate technology, and would foster cooperation among businesses, NGOs and communities.

Technology and the Environment

The technology transition would sharply reduce the human footprint on nature. The three pillars are efficient use, renewable resources and industrial ecology. Efficient use means radically reducing the required resource inputs for each unit of production and consumption. Renewable resources means living off nature's flows while maintaining its capital stocks—solar-based energy rather than fossil fuels, sustainable farming rather than land degradation and preserving ecosystems rather than liquidating them. Industrial ecology means largely eliminating waste through re-cycling, re-use, re-manufacturing and product life extension. We consider several key sectors.

Energy   The challenge is to provide affordable and reliable energy services without compromising sustainability. This is a both a social and environmental transition. The social energy transition would give access to modern fuels to the global billions who still rely on dwindling traditional biomass sources. The environmental energy transition would cut the demand side through moderated consumption in affluent areas, high end-use efficiency and deployment of renewable sources.

The imperative to reduce global greenhouse gas emissions sets the magnitude and pace for the energy agenda. Climate stabilization at safe levels requires transcending the age of fossil fuels. The path to a solar future would be bridged by greater reliance on natural gas, a relatively low-polluting fossil fuel and modern biomass technologies. Nuclear power is climate-friendly, but other problems—long-term radioactive disposal, uncertain safety and links to weapons proliferation—are incompatible with a resilient and sustainable energy future.

The challenge is immense, but so are the technological possibilities. On the demand side of the energy equation, appliances, lighting, buildings and vehicles can be made highly efficient. Combined heat and power systems can capture energy that would otherwise be wasted. Compact settlements can reduce travel and encourage energy-sparing modes of travel, such as mass transport and cycling. The Internet has the potential to substitute information for energy and materials through e-commerce.

On the supply side, solar energy can be captured in diverse forms—directly by solar cells and heating systems, and indirectly through wind, moving water and biomass. Solar energy can be used to generate hydrogen, a clean liquid fuel that can substitute for petroleum in vehicles. Solar technologies have been gradually expanding their market share, but at a snail's pace. They tend to cost more than fossil fuels, but the gap is gradually decreasing, and would close entirely if environmental costs were factored into prices.

The technological remedies are either at hand or could be matured through a re-prioritization of research, development and deployment efforts. Institutional barriers are more serious.

Technological and infrastructural inertia maintains dominant patterns that have locked-in over the decades. Powerful vested interests seek to preserve dominance in conventional energy markets. Perverse policies subsidize fossil fuels and inefficiency. The incentives for a new energy era must be built into policies, prices and practices that can counteract the recalcitrant fossil fuel economy in high-income countries, and allow developing countries to leapfrog to the solar era. In a *Great Transition*, this would become a popular imperative.

Food and land   The goal is to provide sufficient food for all, while preserving soil quality, protecting biodiversity and preserving ecosystems. The "green revolution" had great success in raising crop yields. But heavy use of chemicals has polluted soils and groundwater, and nearly a billion people remain undernourished. Forests and other ecosystems continue to be lost to agricultural expansion as growing populations, higher incomes and more meat in diets require more farmland and pastures.

The agriculture transition would promote farming practices that are more knowledge-intensive and less chemical-intensive. Complex farming systems would build on natural synergies such as nitrogen-fixing plants grown in combination with other crops to reduce fertilizer requirements, and integrated pest management to reduce pesticide use. Soil conservation would maintain quality through efficient drainage, terrace agriculture, conservation tillage and other techniques. Fish farming would adopt strong environmental standards, while marine harvesting would be kept within the carrying capacity of wild fisheries. On the demand side, moderated food demands would lower pressure in a *Great Transition* as populations stabilize and diets shift away from meat.

Biotechnology holds the promise of increasing yields, reducing chemical input, conserving water and improving the nutritional content of crops. But it carries the risks of reducing crop diversity, of degrading ecosystems through accidental release of pest-resistant organisms into the wild, and of increasing the dependency of farmers on transnational agribusinesses. The transition would be guided by the precautionary principle, deploying biotechnology where it

can enhance agriculture production in an environmentally sound and safe manner. At the same time, complementary advances would be sought in areas with lower risk and greater public acceptance, such as improved breeding.

The preservation and restoration of the world's ecosystems is a central theme of the transition. This would be supported by the valorization of what ecosystems provide in goods, services, aesthetics and habitat. Trends in land use would change, including controlling urban sprawl through more compact and integrated settlements patterns. The reduced stress from pollution, climate change and excessive water extraction would help maintain the resilience of ecosystems.

Water Freshwater sustainability seeks to provide sufficient water for human needs, economic activity and nature. Diverse solutions matched to local conditions will be needed to manage demand growth and enhance supplies.

Water requirements can be reduced through efficiency improvements in irrigation and other water using activities; by reducing transmission losses; and by considering non-hydropower generation supply. New crop varieties and improved cropping methods would increase the "crop per drop" for both irrigated and rain fed agriculture. Some arid places would need to rely on greater food imports to reduce local water requirements for agriculture. In areas of high water stress, the lower populations and revised consumption patterns of a *Great Transition* are critical to the water transition.

Intact ecosystems would help to maintain resources by moderating flood runoff and enhancing groundwater storage. Also, greater deployment of unconventional supply methods, such as small-scale water harvesting schemes, rainwater capture, desalination in coastal cities and recycling treated wastewater for agriculture, would contribute. The key is to place the freshwater issue in a systemic framework that comprehensively considers ecological and human needs. Decision-making would move from centralized agencies to the watershed where the allocation of water can best be resolved. The principle of the active participation of stakeholders representing diverse interests would be critical for balanced and resilient solutions.

Environmental risk and development   In the mature industrial countries, the goal is to phase in technologies, practices and infrastructure as capital stock turns over. In developing countries, the goal is to leap to advanced eco-efficient technologies that are well suited to their social and ecological endowments, thus avoiding a recapitulation of the resource-intensive stages of industrialization. Alternative pathways are illustrated in Figure 10. By adopting innovative technologies and practices, developing countries could tunnel below the safe limit.

On the sustainability path, technologies and practices can act synergistically—ecosystem protection sequesters carbon, water conservation reduces soil degradation, renewable energy mitigates both climate change and air pollution. The mandate for applied science and human ingenuity is to radically reduce the flow of materials into the global economy, and the waste that is generated. The available pool of technologies and creative capacity provides a strong platform for launching a technology and environmental transition.
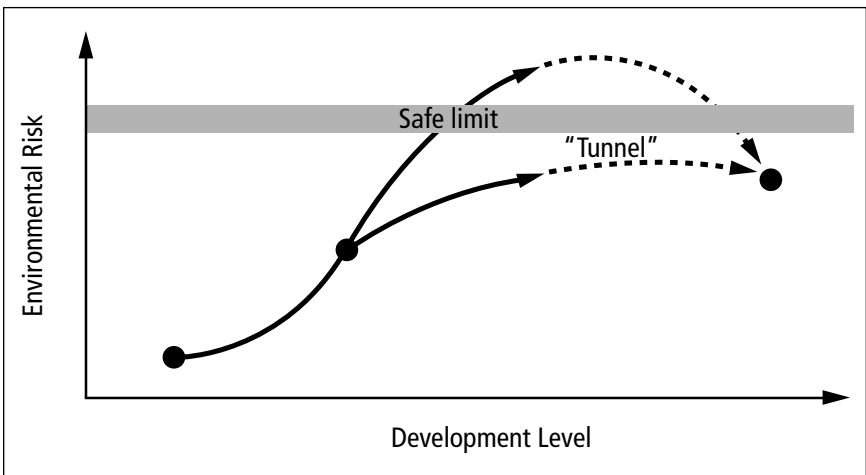
Based on Munasinghe (1999).

Civilizing Globalization

Globalization is more than economic integration. Words, images and ideas outpace the flow of products, raising fears of loss of language, culture and values. Counter-currents emphasize ethnic, national and religious distinctiveness. Flows of people—temporary, permanent and forced—also swell. Refugees and world trade grow at similar rates. The influx of immigrants makes places of wealth and opportunity more diverse, and that has often not been welcome. Diseases move with people and products, affecting human health, crops and livestock. Biological invasions can destroy native biota. Environmental harms are exported to countries with weaker protection. Terrorism becomes globalized. Aggressive marketing and rapid cultural change fuel global consumption. Yet, billions are excluded from prosperity.

But as communication carries a culture of consumption, it also carries a culture of concern with the fate of the earth and future generations. It links people and groups in an expanding project to share information and influence development. The widening, deepening and accelerating interconnectedness that characterizes globalization is the precondition for a *Great Transition*. Globalization forges expanded categories of consciousness—seeing humanity as a whole, its place in the web of life and its links to the destiny of the planet. It distributes systems of production and participation, creates potential roles for corporate and civil society and makes greater equity possible.

For those who aspire to a more humane, sustainable and desirable future, simply being "against globalization" is not satisfactory. Rather, the struggle is over the character of globalization in the coming decades. If its promise is to be realized and its perils avoided, globalization must be reshaped. A *Great Transition* needs globalization and needs to deal with its discontents. The victims of globalization and their many concerned allies are doing more than demonstrating in the streets. They are also developing an understanding of what is needed to civilize it (Held et al., 1999; Helleiner, 2000).

The principles and means for shaping a new kind of globalization are in place. A *Great Transition* would find rights assured, nature treasured, culture rich and the human spirit animate.