4. Example Policy Reforms

4.1. Reversing Consumerism

Economic policy has focused almost entirely on promoting continuous growth in GDP. Economic growth often translates into more, instead of better consumption, excessive material and fossil fuel use, and increased waste. The culture of consumerism has developed, in part at least, as a means of enhancing consumption-driven economic growth. But it has had damaging psychological and social impacts on people’s well-being. There is a need to systematically dismantle incentives for excessive material consumption and unproductive status competition [11,16].

Excess consumption is driven in part by artificially low prices that fail to reflect full social and environmental costs. Natural resource prices fail to reflect demand by future generations or the degradation of ecosystem services caused by resource extraction. Export-oriented economies often fail to impose or enforce labor and environmental regulations in order to keep prices down. Wages, particularly in poor developing countries, are frequently inadequate to meet basic needs, and working conditions are often dangerous, debilitating, and degrading [108], contributing to a decline in workers’ well-being [109]. We need to have effective labor and environmental policies in place that prevent the exploitation of foreign workers and internalize environmental costs. When we account for the real costs of labor, resource use, and externalities, then import prices will increase and the demand and consumption for these goods/services in rich countries will decrease. Also, the increase in labor wages will benefit the poor in developing countries, raising their purchasing power and improving their livelihoods [109]. High levels of consumption in rich countries may promote excessive resource degradation in poor countries, which jeopardizes well-being in the poorer countries.

Income inequality also drives excessive consumption. Once basic needs are met, relative income and status may be more important than total income. Consumption decisions are driven by comparisons with a reference group and the pursuit of status [109,110]. Status, however, requires consuming more status goods than one’s peers and creates a never-ending treadmill. When the extremely wealthy spend more, less wealthy individuals on the fringes of their social circles also feel compelled to do so, followed by the even less well on the fringes of their circles, in what economist Robert Frank describes as an “expenditure cascade” [111]. In the presence of growing income inequality, this leads to a cycle of excessive work and indebtedness that can dramatically decrease quality of life. Partly as a result of the status treadmill, increases in labor productivity, education, skills, etc., have led to increases in production and consumption of goods and services, instead of more leisure time, earlier retirements, more holidays, etc.

Decreases in consumption in some goods and services can have rebound effects, leading to increases in consumption elsewhere [112]. For example, when people save money by driving a more fuel-efficient car or by increasing the energy efficiency of their homes, they may spend their savings on a holiday flight, resulting in a net increase in energy use [113]. Similar results can occur on larger scale, when increases in the efficiency of resource use lead to greater marginal benefits and an increase in total use [114]. In order to decrease consumption, all prices need to reflect real costs (environmental, social, and climate externalities). This will help achieve changes in consumption behavior and
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will limit, or even decrease, rebound effects. Policies should also target the composition of production and consumption to ensure that rebound effects are minimized. We can also decrease consumption through decreases in work time, which will translate into less purchasing power and thus less consumption and environmental degradation. By decreasing income and spending (income caps), it will also limit rebound effects [112,115]. However it does not guarantee a shift to cleaner consumption [112]. A cap-auction-trade scheme, rather than a tax, avoids the rebound effect by simply limiting quantity; any demand rebound just bids up price.

Improvements in technological efficiency are necessary, but not sufficient. They are more appealing to all because of their apolitical nature and mostly because they do not challenge production and consumption. However, there is an extensive literature showing how improvements in technological efficiency have led to increases in production and consumption due to a decrease in relative prices of products/services [72,109,115-117]. Some benefits of improvements in energy efficiency are offset by an increase in the demand for the product or service due to a decrease in price [116].

The increase in overall productivity through technological innovation has led to an increase in consumption and use of high quality energy and material resources, while avoiding the real social and environmental costs. Technological innovation also means a decrease in labor; the more efficient it becomes, the fewer workers are needed to produce the same level of outputs. This would work as long as the economy continues to grow and offsets labor productivity, but if there is a slowdown in the economy, then increasing productivity may also lead to increasing unemployment [118].

For many politicians, growth (increases in production and consumption) equals more jobs, thus attempts to decrease productivity growth are seen to reduce welfare [118]. However, decreases in productivity growth can be achieved by shifting from a product-based economy to a more service-based economy, since services are usually considered less material- and energy-intensive [118]. But it all depends on the type of services that are pursued; activities in the service sector can heavily depend on high levels of material and energy consumption (i.e., tourism and retail distribution). A focus on activities that promote social interaction and community engagement (farmers markets, crafts, community green projects, among others) will reduce labor productivity growth. The green service sector (less material and energy intensive) will also contribute to a reduction of GHG emissions [118].

We should also look at productivity growth as an opportunity for increasing leisure instead of consumption [109]. One approach to decreasing material and energy consumption is to reduce the time spent working. Less hours of work will limit production and consumption. Working less typically leads to reduced spending and also a shift to lower-impact forms of consumption: taking the bike instead of the car; cooking at home instead of buying fast food [119].

In addition, other regulations or policies that have been identified to decrease and/or reverse consumerism are:

• Taxing luxury consumption [16,115,120]: progressive taxes are necessary to disincentivize over-consumption, which has been pursued at the expense of increases in free time and environmental quality. For example, the book _Luxury Fever_ has proposed a shift in the United States tax code to exempt savings and tax only consumption at very progressive rates [16]. Similarly, Howarth has proposed taxing status goods that increase energy and resource consumption [120]. Such policies
could even benefit the rich by decreasing the level of consumption required to exhibit status, while leading to environmental benefits.

- Redirecting consumption from private status goods to public goods (investing in the commons), which will increase welfare [121]. Government can offer tax reductions or preferential investment conditions for activities that generate or protect public goods, such as green services to disincentivize energy and material intensive production and consumption. The rich could even benefit from higher taxes to fund these public goods: their status will be unaffected by across-the-board income reductions, while they will benefit from more public goods [122].

- Increasing employment in specific service sectors (health, green projects, community based projects, etc.) [115,123].

- Shifting the traditional focus of investment towards renewable energy, public goods, green (resource-efficient) technology, climate adaptation and mitigation, etc.

- Redistributing surpluses from private consumption to communal activities—urban food gardens, recycling, car-pooling—since communal activities tend to reduce conspicuous consumption.

- Incentivizing voluntary self-restrictions [115,124].

- Cap-and-auction policies for waste emissions that would internalize externalities and promote a shift towards cleaner consumption [112].

- Promoting and improving communication and the diffusion of information to reduce consumption, which would incentivize voluntary reductions in consumption and more socially desirable decisions; peer pressure plays a key role in consumption. This could be achieved by restoring the requirement for public service messages in exchange for private sector use of the airwaves.

- Directly controlling commercial advertising and media. The advertisement of status goods increases consumption since it encourages people to seek more income and to pursue wants that did not exist before. Regulation of advertising can lead to a change in individual/societal preferences [112,115]. Commercial advertising represents a social cost and the regulation of advertising will likely affect compositional consumption, increase well being, and decrease environmental degradation. Other measures might include banning advertising to children and in public spaces, establishing commercial-free zones and times, taxing advertising, and funding the right of reply to advertisers’ claims [125,126]:

  * **Banning advertising in public spaces**: The Clean City Laws of São Paulo, Brazil. This law, introduced in 2007, completely bans outdoor advertising in the city and fines those who break it. The state of Vermont similarly bans billboards.

  * **Banning advertising for children**: Stockholm decided in 1991 to prohibit ads targeting children under 12 years. Greece does not allow war toy advertisements at all and any toy advertisements are prohibited between 7:00 AM and 10:00 PM. The U.K. does not allow the advertisement of alcohol to youths and requires ads to convey the size of the toys and what the toys can really do.

  * **Tax advertising**: Advertising is currently considered a business expense, exempt from taxation. This exemption should be removed, and an additional tax imposed on companies that spend more than a certain amount on advertising based on the rationale that advertising could be viewed as market externality that increases consumerism.
4.2. Expanding the Commons

To realize the transition to the new economic system we envision, it is necessary to greatly expand the commons sector of the economy, the sector responsible for managing existing common assets and creating new ones. Some assets, such as resources created by nature or by society as a whole, should be held in common because this is more just. Other assets, such as information or ecosystem structures (for example, forests), should be held in common because this is more efficient. Still other assets, such as essential common-pool resources and public goods, should be held in common because this is more sustainable.

One option for expanding and managing the commons sector is to create “common asset trusts” at various scales. Trusts, such as the Alaska Permanent Fund and regional land trusts, can propertize the commons without privatizing them [127]. Barnes [89] provides more specific examples of existing or proposed local, regional, national, and global initiatives for expanding the commons sector:

4.2.1. Local initiatives

a). Land trusts: There are various types of land trusts. One type is meant to protect land from development and degradation, which can be achieved via direct ownership of the land or by ownership of easements that restricts its use (e.g., the Marin Agricultural Land Trust, the Pacific Forest Trust, the Vermont Land Trust). Another type is meant to keep housing affordable. Land is held in a trust, while houses on the land are sold on the condition that the owner cannot profit from rising land values when the land is resold (e.g., the Champlain Housing Trust)

b). Conservation trusts: Conservation funds for the protection of biodiversity that have been created since the 1990s through debt-swap funding or grants. These trusts were created with an endowment that allowed them to cover their short- and long-term needs (e.g., Bhutan Conservation Trust, The Mgahinga and Bwindy Impenetrable Forest Conservation Trust, and Colombian National Protected Areas Conservation Trust)

c) Terrestrial and marine protected areas: Established for the protection and maintenance of biodiversity (marine sanctuaries, wildlife refugees, national parks, etc).

d). Surface water trusts: Acquisition of water rights to protect fish, other species, or aquatic ecosystems. This has also led to changes in agricultural practices like switching crops and changing irrigation patterns. A good example is the Oregon Water Trust.

e). Groundwater trusts: Permit issuance to limit the amount of water withdrawn from the aquifers, e.g., Edward Aquifer Authority in Texas.

f). Community gardens: Food production for neighborhoods and communities and promote community engagement.

g). Farmers markets: Commercial commons that provide fresh and local food, social interaction and engagement, awareness and importance of local produce, and other functions.

h). Public spaces: Spaces for social interaction that can be created by governments or reclaimed from urban spaces by neighbors or communities. Studies have shown that green public spaces can increase social inclusion for immigrant youth [131],
protect against negative health impacts of stressful life events [132], and improve health overall and reduce income related health inequalities [133].

i). **Internet**: Using the Internet to remove communication barriers and improve democracy. Unlike television and other broadcast media, the Internet has very low technological and financial barriers for individuals seeking a presence there. This has the effect of decentralizing the production and distribution of information by returning control to the audience, providing a venue for dialogue instead of monologue. Opinions and services that were previously controlled by small groups or corporations are now shaped by the entire population. Television news networks, sitcoms, and Hollywood productions are being replaced by e-mail, Wikipedia, YouTube, and millions of blogs and forums—all created by the same millions of people who are the audience for the content [127].

4.2.2. Regional initiatives

a). **Air trusts**: An example of a regional air trust is the Regional Greenhouse Gas Initiative (RGGI), a cap-and-auction program in the U.S. Northeast, in which most revenues are dedicated to energy efficiency measures. This not only helps mitigate the distributional impacts by generating cost savings for households [134], but also helps to reduce GHG emissions far more than the caps themselves [135]. The European Union Emission Trading System is a cap-and-trade program that puts a cap on GHG emissions from businesses and creates a market for carbon allowances (UE Climate Action). However, most emission allowances are awarded directly to polluters, creating enormous windfall profits for firms. The goal, however, is to auction off half of emissions by 2013, which should help address this problem [136], and move towards the creation of common property rights to GHG absorption capacity. The United States cap-and-trade program for SO$_2$ emissions was successful at reducing pollution, but since it awarded emissions rights to polluters [137], it is really an example of the public sector transferring common assets to the private sector (which nonetheless may be superior than leaving them as open access resources).

b). **Watershed trusts**: To protect waterways, fish, and wildlife from agricultural run-off through the promotion of best management practices and sustainable agriculture. An example is the Southeastern Wisconsin Watersheds Trust for the Greater Milwaukee Watersheds.

c). **Land value tax**: These taxes capture some of the value of land for society as a whole, while providing numerous additional benefits. Harrisburg, Pennsylvania, for example, introduced a split tax on real estate, in which the tax on land far exceeded the tax on buildings. This made it necessary for owners of abandoned or degraded buildings to restore or replace them, in order to generate the income required to pay the tax, or sell the land to someone who would. The result was a revitalization of the urban center and an increase in its value as a public space.

d). **Buffalo Commons**: First proposed in 1987 for the social and ecological restoration of the Great Plains, the main purpose of the Commons is to re-establish a corridor between now-fragmented prairie lands for the bison and other wildlife to move freely along as well as to promote the health and sustainability of the land.

e). **Regional planning authorities**: These would begin to develop sustainable economic plans for regional implementation, building upon the lessons (positive and negative) of the Tennessee Valley Authority, the Appalachian Regional Commission, and numerous other modern regional efforts, including those in Canada, Australia, and within and between European Union member states such as in Torino, Ireland, and elsewhere [138-141].
4.2.3. National initiatives

a). An American Permanent Fund: The rationale for this fund would be similar to that of the Alaska Permanent Fund, i.e., to distribute common-property income equally to every citizen of the United States. Most of the income of the American Permanent Fund would originate from pollution permits (especially for CO$_2$), but also from the commons’ share of corporate profit. The Fund would contribute to decreasing carbon emissions and improving overall well-being.

b). Common tax credits: The rationale behind this tax is that the wealthier segment of American society owes more to the commons than what they pay to the federal government in taxes. So government would increase taxes on the wealthier while giving them the option to either pay those taxes or contribute to a commons trust. An incentive to do the latter would be a 100-percent tax credit [89].

c). National planning: To help achieve local economic stability, to help distribute work and time in appropriate ways, and to manage potential dislocations caused by reduced growth.

4.2.4. Global initiatives

a). At a larger scale, a proposed Earth Atmospheric Trust could help to massively reduce global carbon emissions while also reducing poverty. This system would comprise a global cap-and-trade system for all greenhouse gas emissions (preferable to a tax, because it would set the quantity and allow price to vary); the auctioning of all emission permits before allowing trading among permit holders (to send the right price signals to emitters); and a reduction of the cap over time to stabilize atmospheric greenhouse gas concentrations at a level equivalent to 350 parts per million of carbon dioxide. The revenues resulting from these efforts would be deposited into the Earth Atmospheric Trust, administered transparently by trustees who serve long terms and have a clear mandate to protect earth’s climate system and atmosphere for the benefit of current and future generations. A designated fraction of the revenues derived from auctioning the permits could then be returned to people throughout the world in the form of a per-capita payment. The remainder of the revenues could be used to enhance and restore the atmosphere, invest in social and technological innovations, assist developing countries, and administer the Trust [142].

b). International agreements are critical for the success of national climate policies and strategies. Through an international agreement, countries will not suffer for having strict national policies in place; they won’t lose their comparative position. This will work in favor of the acceptability of the policies. As a result, there will be a shift toward clean, instead of dirty, production and consumption. It will also incentivize technological change [112].

c). A third possible global initiative is the “green paper gold” introduced by Joseph Stiglitz to promote investment in green infrastructure [143,144]. According to Stiglitz, green paper gold, also known as special drawing rights, are “a kind of global money, issued by the International Monetary Fund, which countries agree to exchange for dollars or other hard currencies.” Stiglitz has argued that SDRs could be used to promote investment in the developing world and expanding the global commons or “global public goods” [144].

Government has a role to play in protecting and expanding the commons. When government is responsible for a common, it should act as its trustee and should be
accountable for it. Government should also increase the allocation of property rights to commons trusts and contribute with the purchasing of former pieces of the commons, now privatized (e.g., through long-term tax-exempt bonds). Common asset trusts of the kind we have described are a mechanism for governments to fulfill these duties.

4.3. Implications of Systematic Caps on Natural Resources

A lasting prosperity requires much closer attention to the ecological limits of economic activity. Identifying and imposing strict resource and emission caps is vital for a sustainable economy. The contraction and convergence model developed for climate-related emissions should be applied more generally. Declining caps on throughput should be established for all non-renewable resources. Sustainable yields should be identified for renewable resources. Limits should be established for per-capita emissions and wastes. Effective mechanisms for imposing caps on these material flows should be set in place. Once established, these limits need to be built into the macro-economic frameworks.

**Cap and Trade:** Ownership of the quotas is initially public; the government auctions them to individuals and firms. The revenues go to the treasury and could be used to replace regressive taxes, such as the payroll tax, and to reduce income tax on the lowest incomes, or else to increase investments in public goods or energy efficiency measures that benefit the poor. Once purchased at auction, the quotas can be freely bought and sold by third parties, just as can the resources whose rate of depletion they limit. The trading allows efficient allocation, the auction serves just distribution, and the cap serves the goal of sustainable scale. However, free trading threatens speculative investments and other forms of gaming the market to capture rent. More frequent auctions of permits that could not subsequently be traded could avoid this risk. The same logic can be applied to limiting the off-take from fisheries and forests. With renewables, the quota should be set to approximate sustainable yield. For nonrenewables, sustainable rates of absorption of resulting pollution or the rate of development of renewable substitutes may provide a criterion [80]. It’s worth noting that in a survey conducted in Vermont, only 5.8 percent of respondents favored distributed revenue equally among households; 64.2 percent favored investing it in natural resources, 14.2 percent favored investing it in public goods such as education and healthcare, and the remainder favored some mix of dividends and public investments [145].

The idea of a carbon tax and other pollution taxes as a replacement for payroll taxes has gotten political support. It has been recognized that it makes more sense to tax what we burn instead of what we earn [146]. A very popular method, the Alaskan Permanent Fund, pays a dividend to the citizens of Alaska from the fossil fuel revenue the state collects [146]. This model is known as “cap and dividend,” “where some fraction of the revenues of an auction on emissions allowance is returned to citizens on an equal per capita basis” [147]. However, in the case of fossil fuel use, where prices are determined at the global level, and not influenced by extraction rates in any single state, this leads to citizen pressure to “drill, baby, drill,” increasing outputs and revenue. In the case of cap and auctions on emissions, local caps would determine prices. Given the highly inelastic demand for fossil fuels (and hence for the waste absorption capacity for CO$_2$), the tighter the cap, the greater the total revenue, since every 1-percent restriction in quantity would lead to a greater than 1-percent increase in price.
Cap and dividend is considered by some to be a fair and transparent model, since it is based on the amount of carbon-based energy a person consumes. The more a person consumes, the more he/she would have to pay. It would also have a progressive distributional effect; poor people usually consume less energy than the middle class and the rich [147]. For cap and dividend to work, there would have to be a cap on fossil fuel supplies. It is much easier and more cost-effective to have an economy-wide cap on suppliers than emitters. Companies that sell fossil fuel would have to buy permits equal to the carbon content of the fuels they sell. Then, once a year there would be an auditing to make sure the companies have enough permits; if they don’t, they would have to pay a high penalty. The number of permits would be reduced every year, decreasing the amount of carbon that enters the economy. As the carbon cap declined, prices would increase and private capital would shift to cleaner alternative technologies and cleaner production and consumption.

Another important element of this model is the dividend, which would be paid equally to every American once a month. As carbon prices increase, so would the dividend, and this in turn would increase the livelihoods of the poor [146,147].

However, from a global perspective, a cap and dividend regime in the United States or other wealthy country may be unfair. Both Europe’s existing cap and any of the proposed caps in the United States far exceed a fair share of global absorption capacity, and completely fail to account for past contributions to the carbon stock. As discussed previously, reducing flows to ecologically sustainable levels in the short run would likely cause economic collapse, with the worst impacts likely to be borne by the poor. Perhaps the most sustainable, fair, and efficient approach would be for rich countries to invest revenue in making existing infrastructure more energy efficient, and in investing in new, open-source technologies for alternative energy and energy efficiency. This would be more sustainable since it would accelerate the rate at which we develop new technologies and reduce emissions; it would be more fair because it would put the burden of developing new technologies on the wealthy countries, and because the poor would likely benefit most from more energy efficient housing and infrastructure; and it would be more efficient because information is non-rival and should therefore be open access to all, which requires public sector investment, as explained above. Currently, the United States energy sector invests only 0.03 percent of sales in R&D, which is clearly inadequate given the importance of developing low carbon energy [148].

A variation on the cap-auction-trade mechanism is the commons asset trust, for example, the Earth Atmospheric Trust described above [90]. In this mechanism, as in the cap-auction-trade, caps are established around a resource. However, in this case a trust manages the sale of permits and the revenue from the auction. It can adjust the availability of permits, depending on need, though ultimately resource use cannot exceed planetary boundaries. The trust would provide equal dividends to the citizens (in a national system) or to countries for distribution to their populations (in an international system), or else invest revenues in public goods. The benefit of providing dividends directly to the population is that it provides some mitigation to the inevitable price increases passed down to consumers [146]. However, households and businesses frequently fail to adopt energy efficiency measures with high rates of return [149]. This may be especially true for poor households that lack the resources, knowledge, and initiative required to undertake such investments. Recycling revenue into energy efficiency investments with high rates of return would effectively increase total benefits, and could therefore benefit poor households even more than dividends.
An alternative and intermediate option is also available by returning some fraction of the annual revenues as dividends to the population, but using the remainder for other purposes related to preserving and enhancing the common assets, such as atmosphere and climate. This would allow for rewarding people that have a lower carbon footprint to be rewarded as well as for providing funds for related projects like researching and developing renewable energy, deploying renewable energy technologies in developing countries, paying for ecosystem services like carbon sequestration, etc. [142].

National environmental policies nearly all result in internalizing previously uncounted ecological and social costs. This naturally increases prices relative to those in countries that do not internalize these costs, putting domestic firms at a competitive disadvantage in international trade if the country’s international policy is free trade. In this case national and international policies are inconsistent. An international policy consistent with national cost internalization would require moving away from free trade by imposing cost-equalizing tariffs on imports produced under conditions that do not internalize these costs. This is protection, to be sure—but it is protection of an efficient national policy of cost internalization, not protection of an inefficient national firm. Without such protection, or international agreement on cost-internalizing measures, there would be a competitive, cost-externalizing race to the bottom. Globalization (free trade coupled with free capital mobility) seeks to substitute the transnational corporation for the nation as the controlling economic power. Existing traditional community at the national level is sacrificed to the abstraction of a very tenuous “global community.”

4.4. Sharing Work Time

We need labor policies that allow and encourage shorter work time. Reductions in work time are one of the most cited policies to sustain full employment (or at least decrease unemployment) without increasing output, and to protect workers’ livelihoods [72,112,119].

Work-share programs are considered one of the best ways to respond to a short-term decrease in economic activity. Sharing work time can help reduce, and even prevent, layoffs and also serve as a stabilizer when the economy is slow or the country is facing an imminent recession. Work-share programs help avoid re-hiring and re-training costs and would work best if implemented during the early months of the economic downturn [119]. In the United States, work sharing has helped save jobs. In 2009, work sharing saved 166,000 jobs, three times more than in 2008. Jack Reid, the Democratic senator from Rhode Island, has introduced work-share bills in Congress (in 2009 and 2010) in an effort to encourage more states to implement such programs. Currently 20 states across the United States operate work-share programs [119].

Shorter working hours will improve the work-life balance. Having more time to spend with family and engaging in social interactions has been found to increase subjective well-being, which could lead to decreases in consumption [150-152]. Some of the benefits of shorter work hours are less stress and work pressure as well as more time for activities like gardening, child care, meals, volunteer work, social interactions, and so on [150]. Kasser and Brown found that people with more leisure time have a smaller ecological footprint [151]. Schor also found similar results: there is a significant positive correlation between work hours and the ecological footprint [73].
There are different types of hours reduction that can be used: reduced average hours per job, reduced average annual hours per person, shorter total hours per working life, etc. The different types of hour reduction will have diverse welfare and economic impacts, which is why it is important to have a just distribution of hours to ensure political feasibility in the long run. Ultimately, environmental degradation will depend on total number of hours worked per capita, which is a function of average hours per job per person and the employment-to-population ratio [73].

Increases in productivity of capital and labor can be accomplished through increases in production and consumption, increases in leisure, or a combination of the two. Thus a greater proportion of any future gains in productivity being taken as an increase in leisure will decrease the rate of unemployment and reduce environmental degradation [121]. The shift to policies that channel productivity growth into increases in free time instead of increases in income will impact the product mix and/or the composition of consumption and can increase environmental degradation because of time-use rebound effects. According to a study on the household production function, time-saving innovations in the production of a service result in an increase in the demand for that service. If the service is energy intensive (i.e., transportation), then the energy demand will increase [73,153]. Thus, the time-use rebound effect will depend on the type of activity that increases as work hours are reduced and there is more free time available. At the household level, families with more purchasing power and less time will invest in time-saving activities, products such as faster transportation and fast food, which are both more energy intensive and require less time [154].

From the production side, if the economy is slowing down (decreases in GDP) or going into recession, it would be necessary to reduce work hours in order to decrease or even avoid unemployment (assuming increases in population). From the consumption side, keeping or increasing work hours will lead to increases in productivity growth (GDP growth), which is translated into increased income and consumption [116]. Working hours affect income and fuel the spending culture, which Knight and colleagues have called the “work and spend” cycle [116]. When a society is in a “work and spend” cycle, advertising and marketing are more effective in promoting consumption. Furthermore, the increases in productivity growth, translated into increases in production and consumption, lead to increases in environmental degradation.

Society has been focusing on green and more efficient technology to decrease energy consumption and GHG emissions, however technological efficiency is necessary but not sufficient. Consumption, energy use, and GHG emissions are closely interconnected and depend on how increasing productivity is achieved, through increases in income or through decreases in work hours. Nässén and colleagues analyzed the income effect of shorter working hours and how consumption and energy use is affected, and found a strong relationship between income and energy use [155]. Thus a decrease in work time/income of 1 percent leads to a decrease in energy use of 0.89 percent. However, when analyzing the time effect of shorter work hours—how changes in work hours affect time use off work and, in turn, energy use—the results show that a decrease in work hours by 1 percent leads to an increase in energy use of 0.06 percent and a respective increase in CO₂ of 0.02 percent. If we calculate the net effect of both, the sum of income and time effects, shorter work hours will lead to decreases in energy use of .83 percent and decreases in CO₂ of 0.85 percent [155]. Rosnick and Weisbrot found the same positive significant relationship between work hours and energy use [156]. They showed that a 1-percent increase in work hours per worker increased energy use by 1.32 percent.
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(controlling for GDP/hour, worker/population, and temperature). They estimated that if European Union workers worked as many hours as U.S. workers, there would be an 18 percent increase in energy consumption in the European Union.

Schor argues that there are four main barriers/challenges related to labor costs that disincentivize firms to support decreases in work hours [73]:

a). Firms increase wages above market clearing levels to raise the cost of job loss. Thus longer working hours lead to increases in the cost of job loss.

b). Employment related costs (hiring costs, training costs, fringe benefits, etc.) are structured based on the worker and not on hours worked.

c). Workers paid annual salaries instead of per-hour wages tend to work more. Schor found that working for an annual salary instead of a per-hour salary increases the number of work hours up to 100–150 per year [73].

d). An upward-sloping labor supply function will cause the firm to prefer longer hours to avoid salary increases or decreases in worker quality.

Many firms also do not take into consideration workers’ preferences for shorter hours. Thus, in contrast to what the dominant paradigm of neoclassical economics states, workers do not prefer to work more to increase future income and hence consumption. On the contrary, according to several studies [116,157], workers are willing to forgo future increases in income in exchange for a reduction in work hours, since future income is less valued. For example, using International Social Survey Programme survey data for 21 developed countries, Otterbach and Sanne showed evidence indicating that, in countries with higher GDP, people prefer to work less even if this means earning less income [157,158]. However, it is important to note that workers are averse to decreases in present income because of habit formation (preferences adapt to current income and consumption levels). Furthermore, firms that do allow shorter work hours can, and many times do, penalize workers for choosing them by denying medical insurance, pensions, opportunity for career trajectory jobs or promotions, and so on [73].

Surveys done before the 2008 crash indicate that 30–50 percent of Americans expressed a preference for fewer work hours, even for less pay [159]. Germany responded to the 2008 crash primarily through the adjustment of hours, and as a result unemployment rates barely increased. This was achieved through the combination of a federal scheme to replace lost wages (which accounted for about 20 percent of the reduction in hours), private bargains between employers and unions, canceled overtime, and flexible use of vacation and other time off [159]. There has also been an increase in leisure time in various OECD countries [118].

General policies that would help achieve shorter working hours include:

1. Compensation for reducing working time: a package deal to receive compensation for reducing or sharing work hours [106].

2. Limiting overtime through disincentives to employees and/or raising the overtime premium to make it more expensive for firms to use overtime [106,150]. High levels and increases in income inequality have been identified as one of the reasons workers prefer to work longer hours [75].

3. Standardizing working hours and building flexibility for workers into the labor economy [112,119]. Examples of the latter might include:
a). A federal law that allows shorter hours of work to be compensated through at least partial unemployment insurance, to offset the forgone income. States now have the option under federal law to apply for this but many have not done so.

b). Government hiring on an 80-percent schedule. Government is a big employer and this would have a ripple effect. Policymakers could also structure tax credits to give incentives to employers who hire on 80-percent schedules, which would enable more people to be brought back into the labor force than if hiring were done on the full-time schedule.

4. Promoting self-employment and considering adopting the Danish example of “flexicuity” (a combination of flexibility in the labor market, protection for the self-employed, and labor market policy) [106].

5. Structurally restricting the flow of increased future income in order to reduce consumption. People are more willing to forgo future increases in income and consumption than cuts in current income and consumption [73].

6. As for firms, some incentives that would encourage the firm to accept shorter work time include [73]:
   a). Removing the firms’ upper-limit payments to social welfare funds.
   b). Shifting the responsibility for social welfare to outside entities, like unions, the state, etc. In some cases it may help to create a market for hours, so unions can bargain for workers.
   c). Ensuring cost-neutral work time reductions through the provision of state subsidies to compensate the firm or through the structure of the deals that are struck with the workers.

7. Transforming a percentage of future productivity gains into shorter work time, but for a large part of the population and not just for some workers [155].

8. Ensuring basic citizens’ income to help equalize wages/income disparities and ensure that workers would be more willing to reduce work hours [118].

9. Increasing diversity in labor contracts to allow for shorter work time, early retirement, regular sabbaticals, etc., and at the same time ensuring pension systems as safety nets for workers.