

Long-Term Policy: Definition, Origin, and Responses

by

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Forthcoming in: *Prediction: Breakthrough in Science, Markets, and Politics*, edited by F. Wayman, P. Williamson and B. Bueno de Mesquita.
Ann Arbor, MI: The University of Michigan Press.

(03 April 2009)

Abstract

Long-term policy issues are becoming a challenge for many industrialized and industrializing countries alike. Long-term policy challenges shall be defined as public policy issues that last at least one human generation, exhibit deep uncertainty exasperated by the depth of time, and engender public goods aspects both at the stage of problem generation as well as at the response stage. This applies to environmental problems (such as global climate change), financial issues (such as public debt or public pension plans), or public health (long-term care for the elderly). In the following, I will define the population of long-term policy issues, discuss which policy problems may qualify, explore the reasons why they exist, and summarize policy designs to cope with them. Global climate change will serve as an illustrative example.

Acknowledgements

In initially exploring long-term policy problems, I greatly benefited from discussions with Michael Dutschke, Anne-Therese Gullberg, Justin Leahey, and Axel Michaelowa. I am grateful to Claudio Cioffi-Revilla for comments on an earlier version of this contribution. A summary version has been previously published (Sprinz 2008) and inspired a special issue of *Global Environmental Politics* on “long-term environmental policy” (Sprinz 2009b).

A government might, for instance, want to discourage building in areas prone to hurricanes. So it warns citizens that no compensation will be given for houses in such areas should disaster strike. If people believe the warning, they will not build. But if they expect (as history suggests they should) that the government is likely to soften its stance and pay for hurricane damage after all, they will ignore the warning. Before the fact, the government wants to stop building; afterwards, it wants to compensate those who have suffered. Mr Kydland and Mr Prescott refer to such conundrums as “time consistency problems” (Economist 2004).

It appears we are surrounded by long-term policy problems. Public and private pension plans for the elderly are currently redesigned so as to close the gap between implicit entitlements given out in the past and the ability to actually honor those financial obligations; public debt sharply restricts the opportunities for politicians to enjoy the fruits of pork barrel in countries such as Germany, Japan, France or Italy even before the onset of the financial crisis early in the 21st century. Public health care systems seem to be stretched in some industrialized countries; global climate change, if unabated, may lead to severe sea-level rise and subsequently dislocate substantial parts of the earth’s population which lives in proximity of the coastal areas. Could even the 2005 hurricane Katrina point to a long-term policy problem? Sustainability, interdependence, globalization, and other terms have made a career by being imprecisely used, thus it is prudent to define the object of research as precisely as possible to facilitate a productive discussion as well as delimit the scope of future study.

In the following section, I suggest a definition of long-term policy problems. In the following section, I briefly discuss a list of issues which may be inductively considered to be long-term policy problems. The interplay between both steps is likely to lead to a fruitful discussion about the boundaries of the study of long-term policy problems. Subsequently, I outline two explanatory paths for the emergence of long-term policy problems which are followed by a section on select response options. The management of climate change at the European level will serve as an illustrative example of managing long-term policy problems.

1. Defining Long-Term Policy Problems

Long-term policy challenges shall be defined as public policy issues that last at least one human generation, exhibit deep uncertainty exasperated by the depth of time, and engender public goods aspects both at the stage of problem generation as well as at the response stage.

First, a long-term problem exists only if the mechanism creating it leads to substantial adverse effects for at least a human generation of 25 years or remedies take an equally substantial amount of time.¹ Political proposals by governments to undertake interventions like substantial devaluation of pension entitlements or substantial reductions in net debt by way of welfare cuts are unattractive to most electorates in the short run and thus are expected to lead to the removal of the government of the day. Opposition parties with a chance of being voted into office are likely to be only marginally more enthusiastic as they might fear a similar fate. For example, German mandatory pension entitlements have been downscaled by a reduction scheme stretching over two to three decades, but no one, including the government that initiated these changes, sees this as sufficient to solving the looming problem of underfunding the compulsory pay-as-you-go pension system.

Second, deep uncertainty, “a situation where the system model and the input parameters to the system model are not known or widely agreed on by the stakeholders to the decision”, refers to the breadth of parameter values which we may contemplate (Lempert 2002). For example, there is considerable uncertainty regarding the price of carbon offsets under various choices of policy instruments, and we have little experience with accurately predicting the price of carbon offsets for a 50 percent emission reduction over the next half century.

Third, public goods aspects relate both to the generation of long-term policy challenges as well as ways to respond to them. Quite often, long-term policy challenges are generated by externalizing some cost to the public, both contemporaneously as well as intertemporaneously. For example, if historical carbon emissions already lead to uncompensated climate-related impacts now, then some past decision-makers will have benefitted, knowingly or unknowingly, from carbon releases at the expense of present generations. In addition, curbing future emissions itself is a public goods problem in a mostly decentralized world. Those countries serving as leaders in international climate policy may not

¹ I follow the convention to define a generation as 25 years. See <http://en.wikipedia.org/wiki/Generation> (accessed 03 April 2009).

witness immediate benefits for themselves, and future benefits may be quite uncertain, thereby making it profitable for only a small range of countries to venture into global public goods productions – and others to free-ride.

Overall, long-term policy challenges pose a rather difficult class of challenges that are beyond the scope of single parliaments, political and bureaucratic tenures in office, and yet have eschewed comparative research.

2. The Population of Cases

There is a range of policy areas where first suspicion points to classification as a long-term policy issue. I have elaborated three criteria above. Some countries or geographic/political entities are able to cope sufficiently well with specific long-term challenges while others do not. In order to topically qualify as a long-term policy problem, we should therefore focus on the modal or median situation across countries or the world at large. In the following, I will discuss a few prominent policy areas and provide a first approximation on whether they fall under the rubric of long-term policy challenges or not. This topical overview will include comparative and international political economy, energy & environmental issues, violent conflict, major societal changes, demography & public health, as well as a residual category.

First, within the fields of comparative and international comparative political economy, monetary institutions are often mandated to control inflation, in the field of fiscal policy, large-scale subsidy programs (e.g. agriculture and rust belt industry adjustment programs) qualify, structural unemployment exists in many industrialized countries, and mandatory public pensions systems are in actual trouble or projected to become so in honoring previously granted explicit or implicit entitlements.

Not all of these problems qualify as long-term policy issues. Within a human generation, monetary institutions have managed to cure hyperinflation, although this may lead to severe industrial restructuring and substantial transfers of wealth within (and sometimes between) economies. Within the fiscal policy stream, providing breathing space for former leading sectors (coal, steel, agriculture) by way of large-scale and enduring subsidies often qualifies as a long-term policy issue. Even market transformation, e.g., the creation and nurturing of Airbus by European governments over 30 years to change the airline industry for

aircrafts carrying more than 100 passengers is a good example; it also appears to have some common good characteristics as it liberated a monopolistic market dominated by Boeing from lack of technological progress. Creating and maintaining public infrastructures is certainly a long-term policy challenge as many public sector budgets are unable to keep infrastructures in good shape. Structural unemployment is the likely result of both regional policies to shield electorally important industries from further decline as well as the rigidities of collective bargaining arrangements which often do not readily respond to the business cycle and changes in the industry structure. Structural unemployment is certainly a long-term policy problem in much of Europe. Finally, the level of real public debt and the servicing of interest payment as well as repayment of the principal prove to be a problem for some countries even before the financial crisis in the early 21st century. At the very least, highly indebted countries that honor their obligations lose considerable freedom to embark on new costly public policy programs. For example, the second largest item of the German federal budget is servicing the federal debt. Such countries are forced to downscale other expenditure programs or increase revenue by taxes to embark on new policies; otherwise, they run the risk of sovereign default. Russia and Argentina have come close to this over the past decade. Public debt may be a borderline long-term policy issue as fiscal discipline (i.e., no new public net debt) combined with moderate economic growth could limit the problem considerably.

Second, environmental, energy and natural resource issues as well as access to raw materials could be considered long-term policy challenges. Perhaps climate change serves as the most enduring environmental problem, but biodiversity and desertification are likely to follow suit. In the case of climate change, the multi-decadal release of emissions of greenhouse gases (principally carbon dioxide, methane, and nitrous oxides) are still effective over half a century later and alter the state of the atmosphere; a shift of the energy sector from substantial reliance on fossil fuels to renewable energies would easily take a generation or longer. Availability of and access to natural resources, as far as they are slowly depleting (such as oil, gas, or coal), are not long-term problems from an energy standpoint. All of these could be replaced by a low-carbon energy system built on renewables (wind, solar, biomass) and some studies suggest this could be achieved even at negative economic cost. Raw materials (excluding energy resources) are largely no long-term policy problems in so far as international markets work with reasonable efficiency and substitutes are often available – at a cost. The preservation of large-scale commons, such as Antarctica, pollution of the outer space and cultural landscapes qualify as long-term policy challenges.

Third, demographic and public health issues qualify as long-term public policy problems. Demographic changes, both the first demographic transition (to larger surviving families) and the second demographic transition (to smaller surviving families) represent long-term policy challenges. The first transition essentially led to a substantial increase in demand for natural and human-made resources which some advocates responded to by advocating zero population growth, and the second transition mostly poses a problem by way of the strain it may put on pay-as-you go systems created in some “modern” welfare states over the past century. Long-term public health challenges become perhaps the most visible as modal parts of whole generations are becoming overweight and subsequently prone to a range of costly diseases. Preventions to be taken against virulent viruses (such as SARS and avian flu) require essentially the maintenance of a public health care system as well as more specific treatments even if there are no pandemics occurring in a specific time interval. The recent emergence of resistance against standard medical treatments (e.g., antibiotics, malaria, and some strains of flu) is a challenge where our hope must be placed on medical innovation and smarter prescription policies.

Fourth, violent conflict between and within societies has plagued humankind for millennia. To the degree that violent conflict has long-term origins and/or long-term effects, it falls under the rubric of long-term policy issues. Cycles of war associated with international power transitions serve as the most prominent cases. The spread of terrorism as well as the enduring incentives for some countries to develop weapons of mass destruction as well as nuclear deterrence – which have enduring consequences for interstate relations – add to the proliferation of long-term policy issues.

Fifth, societies undergo a range of internal transitions or transitions involving close neighbors. Religious transitions, such as the reformation in Europe about four centuries ago still had a discernible impact of the European party system in the 20th century. Migration and societal integration issues qualify more easily as value and behavioral patterns of migrants and ethnically cohesive groups may well be enduring beyond a generation, but it substantively depends on the political and cultural context whether this is a more continuous process (such as in the USA) or a more discrete challenge (such as immigration into Western Europe over the past three decades).

Finally, a sixth group of issues is rather heterogeneous, but may also qualify as long-term policy challenge. Among these, corruption and organized crime across substantial segments of society in developed and

developing countries alike pose a sincere risk to the sustainability of democracies.

In conclusion, not all problems we initially considered are indeed long-term policy problems, but there is no paucity of those likely to honor the three definitional dimensions outlines further above.

3. Why Long-Term Policy Issues Arise

Why do problems, such as underfunded pension plans, lack of infrastructure to protect society from the effects of natural disasters, or anthropogenic climate change impacts, exist? In essence, there are two major explanatory routes. First, the time inconsistency problem may loom and not allow for consistent policy-making over time, and second, even if multiple generations are included in decision-making, a coalition of older generations and segments of younger generations may support intergenerational redistribution. In the following, I will briefly sketch both perspectives.

In their seminal work on time inconsistency, Kydland and Prescott (1977) demonstrate that optimal choices at one point in time may be at odds with optimal choices taken at future points in time.² Policies may be designed such that one policy rule is administered in the first period, e.g. encouraging low inflation by way of wage restraint. However, at a later point in time, it may be the best policy to actually permit some degree of inflation so as to reduce short-term unemployment. More generally, governments are tempted to renege on earlier promises. “The suboptimality arises because there is no mechanism to induce *future* policymakers to take into consideration the effect of their policy, via the expectations mechanisms, upon *current* decisions of agents” (Kydland and Prescott 1977, 481).

For example, if it is not forbidden to build houses in flood plains, people will build houses in such locations while anticipating that the government will ultimately build dams so as to protect them or compensate them for flood damages incurred.³ This example was

² Research on policy inconsistency contributed to the award of the 2004 Nobel Prize in Economics to Kydland and Prescott (<http://nobelprize.org/economics/laureates/2004/index.html>, accessed 03 April 2009).

³ This has happened in Germany to homeowners in areas at risk of severe flood during the first decade of the third millennium, and for the victims of Hurricane Katrina the US federal government committed itself to an *aggregate* compensation of the damages incurred.

actually mentioned by Kydland and Prescott in the 1977 (!) (Kydland and Prescott 1977, 477). Expectations about future policies impact current behavior. Thus, these problems resemble moral hazard problems within a time-ordered structure rather than being of a contemporaneous nature. It would have been preferable to forbid erecting housing in such areas and stick to the announced rule. As a consequence, no houses would have been built in risk-prone areas or by risk-taking investors, and governments would have been saved from paying compensation and losing credibility.

As a result of their findings, Kydland and Prescott advise to bind present *and* future decision-makers, e.g., by having a fixed rule that is enforced over time rather than having substantial discretion:

The implication of our analysis is that policymakers should follow rules rather than have discretion. The reason that they should not have discretion is not that they are stupid or evil but, rather, that discretion implies selecting the decision which is best, given the current situation. Such behavior either results in consistent but suboptimal planning or in economic instability. There could be institutional arrangements which make it a difficult and time-consuming process to change the policy rules in all but emergency situations (Kydland and Prescott 1977, 477, 487).

The adherence to rules and its positive implications for government credibility had substantial impact on the design of institutions of monetary policy, esp. the rule-based expansion of monetary aggregates that many central banks adhere to following the 1970s period of stagflation. The financial crisis of the early 21st century also shows when the escape clause may be appropriately triggered.

A second perspective on why intergenerational issues may arise originates from models of intergenerational redistribution. For example, Tabellini (1991) builds a simple two generation model where the parent generation lives for two periods while the children generation only lives for one, i.e., they overlap for one period when they also take common decisions. While both generations receive initial endowments financed through government bonds, the parental generation also received unequal amounts of non-storable output and it can bequeath parts of its wealth to its offsprings. By assumption of this model, the transfer of wealth is only possible by way of government bonds, while taxation is imposed on both generations.⁴

⁴ There is no government consumption in Tabellini's model. As a consequence, the role of government is reduced to offering bonds and taxing agents to service the debt.

Since the parental generation commands a first mover advantage, it can issue debts, but it faces the risk that future generations renege on repaying those bonds in the second period. In his model, Tabellini (1991) demonstrates that a coalition of parents and wealthy children supports the issuance of public debt, although this has intergenerational redistributive effects. The logic supporting the finding that wealthy children favor not to repudiate debt is that they would otherwise endanger their bequests. Furthermore, repayment of debt is broadly distributed among the children's generation and thereby *intragenerational* redistribution occurs. For the findings to hold, the debt originally issued must be large enough and sufficiently widely spread so that a coalition of parents and children supports such a policy and does not renege on servicing the debts.

The models of time inconsistency and intergenerational redistribution have some aspects in common. Present generations do not know what exactly the decisions of future generations will be. In both models, early generations cannot precommit other generations, except under specific institutional arrangements. For the long-term policy challenges reviewed in Section 2, there has been little rule development and/or rule adherence over time. For example, while German federal and state constitutions forbid issuing debt beyond the amount of investments during a budgetary period, several state budgets have been ruled unconstitutional by state supreme courts. In fact, a majority of the German Länder budgets is considered to be in violation of the Länder constitutions – before the onset of the financial crisis in the early 21st century. Some governments, such as the government of Lower Saxony, actually outlines plans on how it may pass *future* budgets in compliance with its constitution. Both models also demonstrate that intergenerational effects can arise in the first place. The two models, however, differ in their implications. While Kydland and Prescott foresee rule development and the execution thereof by institutions that are removed from day-to-day affairs, Tabellini demonstrates that parental generations have bounds of discretion in issuing obligations for future generations, and that within such bounds, there can be majoritarian intergenerational support for such policies. The latter, however, is only possible when goods (bequests and intergenerational generosity) and bads (taxation) are properly balanced.

4. Response Options

Given the existence of long-term problems, it is beneficial to know from which menu of options policymakers could make selections. This brief exploration comprises just a few options, including the

- “sugar daddy” solution,
- commitment to rule-based decisions,
- intergenerational accounting, and
- liability.

4.1 *Sugar Daddy Solution*

Perhaps the most straightforward solution is to buy out the constituency that accounts for the problem. Following proposals by the European Commission to compensate its sugar beet industry in exchange for downsizing in the face of much lower world market prices for sugar cane, I will coin this the “sugar daddy” solution (Economist 2005). In the particular case, the adjustment is essentially financed by third parties, namely the taxpayers of the EU in return for lower consumer prices.⁵ In essence, an external financier who is capable to solve the long-term policy problem has to be found. In case of costly long-term policy problems, shifting the burden of adjustment to third parties will certainly be attempted (such as in pay-as-you-go pension systems), but it is unlikely that outsiders will assume responsibility voluntarily. Instead, relevant funds for financing the un(der)funded portions of pension plans, covering public debt, or financing mitigation of and adaptation to climate change are expected to remain national obligations.

4.2 *Commitment to Rule-Based Decisions: Bundesbank and Airbus Solutions*

The second response option has been foreshadowed by Kydland and Prescott (1977) when they proposed the creation of political institutions that follow rules over time and which are detached from day-to-day political pressure. The creation of independent central banks which follow a pre-set path of monetary expansion serves as a good example, as

⁵ Following a ruling by the World Trade Organization, the EU has to reduce its protection of the sugar beets industry. In effect, it is the rule-based decision by the WTO which gives rise to the “sugar daddy” solution for sugar beets.

does the consistent and successful funding of industrial projects, such as Airbus.

In the case of the “Bundesbank solution,” which also extends, for example, to the US Federal Reserve Board and the European Central Bank, members of the relevant decision-making body are politically appointed, yet extremely hard to remove during their tenure. The principal goals of such autonomous bodies are normally broadly enshrined in respective laws which provide broad policy guidance, while specific decisions are taken by committee rule. As a consequence, governments find themselves at times at loggerheads with their autonomous central banks as the effects of fiscal and monetary policy risk to cancel each other out.

A weaker version of rule-based decision-making can be witnessed in the creation of Airbus/EADS as a competitor to Boeing in the commercial aircraft business for carrying more than 100 passengers. In the early 1970s, Airbus did not yet deliver any aircrafts; by the middle of the present decade, it controls roughly 50% of the relevant market. Airbus is the result of restructuring the European civilian aircraft industry by the governments of Germany, the UK, France and Spain who all saw that national industries would not be viable in global competition. Thus, they supported industry restructuring and provided so-called “launch aid” for new aircraft models -- such as the A380. Under a 1992 agreement with Boeing, up to 33% of the development costs of a new plane are borne by taxpayers; if the product is a commercial failure, launch aid turns into an outright subsidy. In the case of commercial success, however, the bonds are repaid and royalty payments are due on *total* sales of this type of aircraft, essentially making taxpayers a project-based part-owner of Airbus. This innovative financing of industry projects could, for example, be applied as “smart” R&D funding for a transition to renewable energy sources. Other applications include public subsidies for private pension plans so as to avoid that retirees will unnecessarily draw on welfare payments rather than private pensions.

4.3 Transparency: Intergenerational Accounting

One way to capture the liabilities which present societies impose on (infinite) future generations is the concept of intertemporal public liabilities. Originally developed by Auerbach, Gokhale, and Kotlikoff, it has been applied in country-specific, European-wide, as well as cross-national OECD studies. Generational accounts “report for every generation alive the remaining net payments to the budget and distribute

the resulting burden, or surplus, equally on all future generations” (Raffelhüschen 2002, 76). They include both explicit government liabilities (such as those included in present law or commitment to repay public debt) as well as implicit liabilities (e.g., those caused by the second demographic transition to small families in advanced industrial societies). The major calculus builds on the infinite integral of discounted net tax revenues minus the present public debt. Taking the infinite integral involves judgment about economic growth, reforms of public entitlements, etc. The latter are normally assessed by expert judgment. The resulting indicator of intertemporal public liabilities (IPL), expressed as a percentage of GDP, is used to judge how “sustainable” public financial affairs are. In an empirical study by Raffelhüschen (2002) of major OECD countries, only Ireland, Norway, and Belgium enjoy rather orderly public finances whereas Austria, Sweden, and Finland show the opposite pattern by having net IPLs of up to 2.5 times their GDP (Raffelhüschen 2002) (see Figure 1).⁶ While these results are dependent on the stage of the business cycle of the reference period as well as the assumptions about time-inconsistent policy changes, they nevertheless provide a coarse overview to which degree public finances are managed more or less wisely. In effect, if public entities would be audited and certified like private companies, such intertemporal public liabilities would have to be added to the balance sheet of any public sector budget plan. While such a design does not assure electoral scrutiny and does not preclude myopic reasoning by politicians and voters alike, it certainly is an accounting device that introduces transparency.

4.4 Liability

Intertemporal public liability is an accounting and information device, but it could also form the foundation for intergenerational liability. It is astonishing to see the difference in liability which chief executives of private firms have to face as compared to political decision-makers: Politicians essentially face only the threat of not being reelected, private sector CEOs have to fear being sued for civil damages (implying a threat to their private wealth) and being subject to criminal law and imprisonment. For example, recklessly sending a private company into bankruptcy normally constitutes grounds for exploring personal liability of private sector CEOs. Politicians rarely face such threats in advanced

⁶ These specific results hold regardless of whether transfers are indexed according to the legal status quo or according to the growth rate of wages.

industrial societies. This could lead politicians to be more risk-taking than they would be in case of more adequate rules of liability.⁷

Liability for public decisions of an intergenerational nature is at least considered in a US court case of environmental NGOs against the Overseas Private Investment Corporation (OPIC) and the Export-Import Bank (Ex-Im). At issue are those decisions of both entities which have climate impacts on US cities.⁸ By 2009, both banks have agreed in a court settlement to take climate concern into account in their future decisions. To provide insurance against the effects of earthquakes, the California Earthquake Authority has built a publicly backed private insurance system that allows for homeowners to insure against damages that are likely to occur over longer time intervals in earthquake-prone areas. To avoid undue moral hazard, policy holders must normally accept a 10-15% deductible.⁹

In conclusion, I have considered four possible solutions to design institutions to deal with long-term problems. In particular, the sugar daddy solution, commitment to rule-based decisions, generational accounting, and liability could be considered as general design options, but it is likely the case that there are more options. Further design options can be envisioned, yet are beyond the scope of this contribution.

5. Managing European Global Climate Change - An Illustrative Example

Human-induced emissions of greenhouse gases, in particular the burning of fossil fuels, essentially perturb the natural carbon and related cycles of planet earth and lead to a variety of adverse effects. These include an increase in the sea level due to thermal expansion and potential melt-down of large Antarctic and Greenland ice sheets, warming in many areas and cooling in others, substantial changes in landcover and agriculture, etc.¹⁰ Following a long debate, the anthropogenic component of causing global climate change is now well-

⁷ Liability for public sector decisions could either (i) induce more (even overly) cautious decision-making or (ii) induce only extremely risk-taking politicians to select themselves to stand for office. Both extremes should ideally be avoided.

⁸ <http://www.greenpeace.org/usa/campaigns/global-warming-and-energy/climate-lawsuit> (accessed 03 April 2009).

⁹ <http://www.earthquakeauthority.com/index.aspx?id=14&pid=2> (accessed 03 April 2009). See also Jaeger et al(2003)

¹⁰ For an introduction to climate change and its policies, see, inter alia, Luterbacher and Sprinz (2001) as well as Sprinz et al.(2004).

established and even accepted by the US federal government. A glimpse of the maximum damage is perhaps best captured in a physicist's et al. view across millennia:

If all estimated fossil fuel resources are burnt, CO₂ concentrations between 1200 parts per million (ppm) ... and 4000 ppm are predicted in the second half of this millennium, leading to temperature increases of 4°C to 9°C and a sea level rise of 3 to 8 m. Predictions of this magnitude are beyond the calibration ranges of climate models and must therefore be treated with caution However, the predicted climate change clearly far exceeds the natural climate variability (~1°C to 2°C) experienced in the past 10,000 years (Hasselmann et al. 2003, 1923).

Given a pre-industrial level of CO₂ concentrations between 280 – 290 ppm CO₂ as well as the feared impacts of sea level rise, it is apparent that global climate change clearly belongs to the class of long-term policy problems.

In response to the threats expected from global climate change, nearly all countries signed the United Nations Framework Convention (UNFCCC) in 1992 – which entered into force in 1994. Subsequently, the Kyoto Protocol was signed in 1997 which outlines emission reduction goals for most industrialized countries. While the USA decided in 2001 to leave the Kyoto Protocol structure, the protocol entered into force in early 2005. At present, countries are deliberating their international commitments for the period after 2012. Of particular relevance for the scope of this contribution is the long-term objective enshrined in Article 2 of the UNFCCC:

The ultimate objective of this Convention and any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system (United Nations 1992).

While the precise implications of the objective of the UNFCCC are still debated, *most* schools of ethics proscribe some action towards limiting the effects of climate change (Ott et al. 2004). Many studies suggest that some 50% of global emission reductions of greenhouse gases are needed by the middle of this century (WBGU 2003, 1-5). Given that there is no universal agreement on the interpretation of Art. 2 UNFCCC in terms of the implied emission reductions or the level of adaptation effort, I will

restrict myself solely to the European Union and its efforts to mitigate climate change in the long term.

European institutions have pondered specific long-term climate mitigation goals since the second half of the 1990s and endorsed a 2 degrees (Celsius) target for an increase in global average surface temperature as compared to pre-industrial levels (Ott et al. 2004, 49-50), thereby advocating essentially a ca. 450-550 ppm CO₂ equivalent concentration goal. The chances of meeting the two degrees target vary by the level of emissions (see Figure 2). This strategy was confirmed by the March 2005 EU Environment Council with a set of specific worldwide average goals. In particular, the December 2004 EU Environment Council endorsed a 50% worldwide reduction of GHG emissions by 2050 as compared to 1990 emissions, and the EU Environment Council of March 2005 endorsed a 15-30% reduction goal until 2020 and 60-80% by 2050 for developed countries.¹¹ By early 2009, the EU may be the only group of countries of substantial size that has a long-term ambition (2 degrees Celsius goal), prepares for unconditional emission reductions (20% by 2020 as compared to 1990), and aims at developed countries to collectively reduce their GHG emissions by 80-95% by 2050.¹²

Broadly in line with such goals, the European Environment Agency (EEA) commissioned a study on the feasibility of such far-reaching goals (European Environment Agency 2005). It assumes EU indicative targets of 40% emission reductions by 2030 and 65% by 2050 as compared to 1990 and concentrates on the energy sector because it accounted for ca. 81% of the EU-15 emissions in 2002 (*ibid.*, 29-31).

By focusing on how a low-carbon energy system can be built, the study's results rely largely on a relatively high price for carbon permits of € 65/t CO₂, fuel substitution away from carbon-rich sources, energy efficiency measures, and carbon capturing and storage.¹³ Despite substantial counterfactual increases of emissions through economic growth until 2030, the report concludes that about 50 to 70% of the EU's reduction goal can be achieved internally whereas the shortfall would have to be bought on the global carbon permit market. While the costs of such an

¹¹ http://ue.eu.int/ueDocs/cms_Data/docs/pressData/en/envir/84322.pdf (accessed 03 April 2009).

¹² http://europa.eu/press_room/presspacks/energy/comm2007_02_en.pdf (accessed 01 July 2008), <http://register.consilium.europa.eu/pdf/en/07/st07/st07224-re01.en07.pdf> (accessed 02 April 2009), <http://register.consilium.europa.eu/pdf/en/09/st07/st07128.en09.pdf> (accessed 03 April 2009)

¹³ The latter is essentially a temporary storage mechanism for carbon, e.g. in geological formations of oil and gas.

ambitious goal are expected to be only 0.6% of the 2030 EU GDP (ibid. 60), this nevertheless constitutes a substantial fraction of costs.

Have any of the design options discussed in the previous section played a role in the European strategy to commit itself to long-term climate protection? First, a sugar daddy solution was never envisioned since the EU did not expect that other countries would solve the issue without EU participation. Second, rule-based decisions play some role in France, Norway, and the UK in terms of establishing long-term goals. At this stage, the unconditional EU goal of reducing GHG emissions by 20% by 2020 may be beyond repeal (Hovi et al. 2009), but the ways to implement the 2050 ambitions of the EU are not yet cast into law. Third, generational accounting exists in the form of long-term impact studies (see also Figure 2) with reference to reasonable global goals, yet, fourth, a mechanism to impose liability for mitigation or adaptation *not* undertaken is still missing.

In order to develop liability for climate change-related damages, countries should be held responsible in proportion for their share of global anthropogenic emissions. In the following, I briefly outline how such a system could be designed.¹⁴ Emitting countries would have to pay into a liability fund over decades, and these resources would be used for adaptation and compensation purposes. As liability would be proportional to emissions, the fund would have to indemnify itself from the proportion of impacts caused by emissions of *non*-members. For example, the EU could create such a liability fund, and if countries wish to receive awards for compensation and adaptation, they would have to go through a court-like system establishing a causal link between the damage claimed and the emissions of GHGs. For the non-EU share of damages caused, they would have to sue other countries independently.

There are three nice features of this liability system: First, it may grow as countries may wish to join a worldwide insurance system rather than being heckled in national courts, by the media, and international NGOs. Second, should the science of climate change alter substantially, then the remaining funds could be returned to its contributors. And third, it provides clear incentives to unconditionally mitigate GHG emissions. As the structure of emitters changes over time, so would be their responsibility for liability. While the industrialized countries would initially be most liable for climate-related damages, this burden would shift proportionally to future dominant emitters – thereby providing incentives for a low-carbon trajectory of their energy systems to be inserted into current development plans (Sprinz 2009a).

¹⁴ This idea is builds on Ochs and Sprinz (2008) and has been developed in detail in Sprinz (2009a).

To conclude, European long-term climate change policy has set itself an ambitious political target. Whereas the EU has taken decisions that are hard to completely reverse, such as the creation of a pan-European market for the trade in carbon permits, some of the design principles for long-term policy could be strengthened. Creating a long-term liability system for climate impact not avoided by the European Union with the option that others may join on an equal footing offers perhaps the greatest promise of continuous attention to long-term climate policy.

6. Invest ... Into Long-Term Policy Research

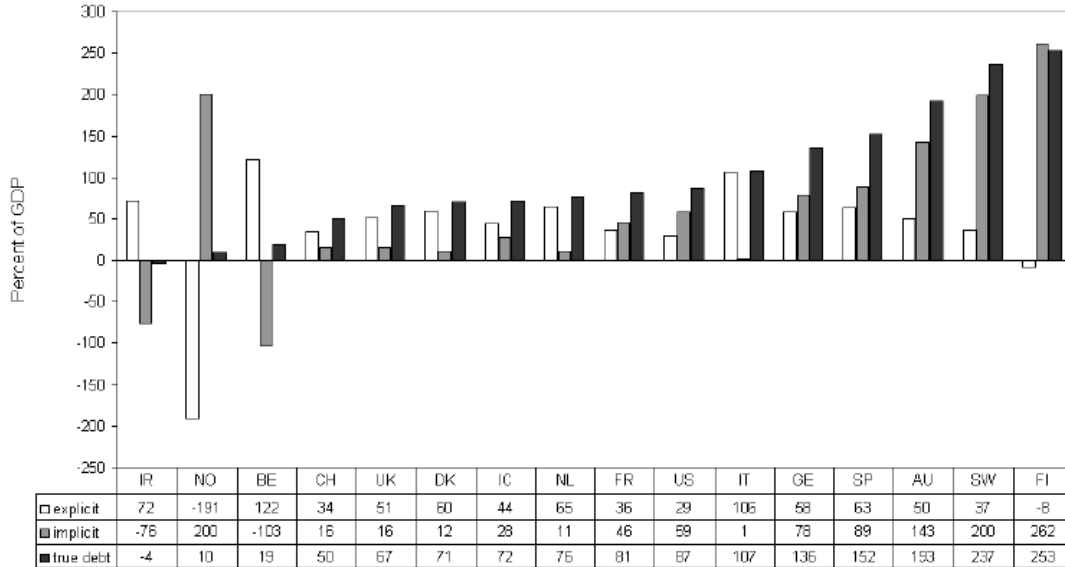
This contribution has explored a definition of long-term policy and subsequently briefly outlined the population of cases. Furthermore, a few mechanisms were reviewed that could account for the emergence of long-term policy problems. Responding to these challenges, I discussed select design options. Finally, European efforts at pursuing ambitious long-term climate policy were outlined and briefly assessed in view of these design options.

Long-term policy challenges are likely to stay with us. Investing into research on how to manage long-term policy problems more wisely merits enhanced attention – by scholars, funding agencies, and practitioners alike.

Figures

Figure 1

Figure 4: Composition of the IPLs in a Cross-Country Comparison (1995), Indexation of Transfers according to legal status quo



Source: Raffelhüschen (2001), identical to Raffelhüschen (2002).

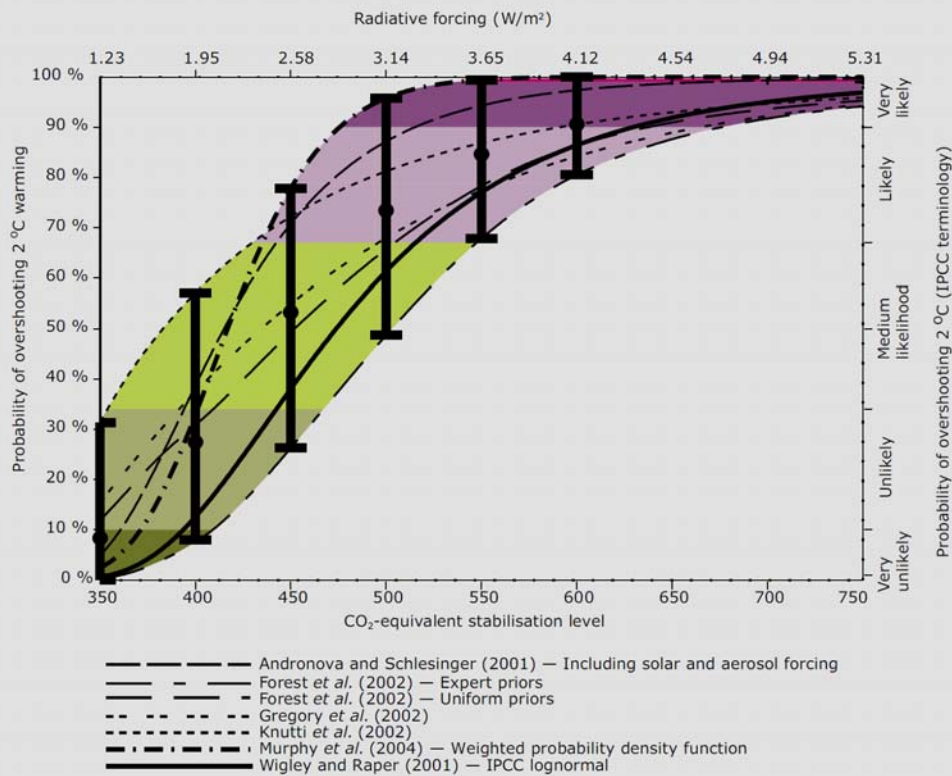
Copyright release to be arranged.

Figure 2: The Two Degree Target

Box 3.1: The two degree target; recent insights

The probability of overshooting the EU temperature target at 550 ppm CO₂-equivalent has recently been estimated to be at least 70 % or to be 'likely' (see figure; CO₂-equivalents in this approach include non-Kyoto greenhouse gases, e.g. ozone and aerosols). In order to minimise the risk of overshooting the 2 °C target, the figure strongly suggests, according to these new insights, long-term sustainable targets of 450–500 ppm CO₂-equivalents or less to be reached well before 2400, providing a medium probability of the temperature target being achieved (Hare and Meinshausen, 2004; den Elzen and Meinshausen, 2005a and 2005b). The target of 550 ppm CO₂-equivalent by 2100, for the Kyoto GHGs, used as target for this report, can, according to this new information, be seen as a conservative upper estimate target for 2100 and requires concentrations to decrease further after 2100.

Figure CO₂-equivalent concentration levels and their associated probability of overshooting the global 2 °C target by 2400



Source: Hare and Meinshausen, 2004.

Note: The definition of CO₂-equivalent (Hare and Meinshausen, 2004) is derived from the net forcing of all anthropogenic radiative forcing agents including warming by tropospheric ozone and the cooling (dampening) effect of (sulphate) aerosols. In 2005, the CO₂-equivalent concentration of the Kyoto GHGs is approximately 425 ppm, while the net effect of all anthropogenic radiative forcing agents, including aerosols, is estimated to be 368 ppm CO₂-equivalent.

Source: European Environment Agency (2005, 21), based on Hare and Meinshausen (2004). *Copyright release to be arranged.*

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