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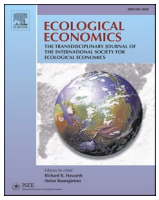

Analysis

Barriers and opportunities in developing and implementing a Green GDP

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ABSTRACT

This article analyses why Green National Accounting based on the SEEA system and/or a "Green GDP" have not been seriously integrated in policy making processes, despite the long-standing public concern that economic growth may harm the environment.. Combining a historical institutionalist and a public policy-oriented theoretical approach rooted in Political Science in order to understand this puzzle, we analyse the case of Denmark; a country widely seen as a green front-runner, and therefore a likely candidate for implementing Green National Accounting/a Green GDP in political-administrative decision-making. We identify several barriers that make a transition towards a Green GDP very difficult. However, with the change of government in 2019 a window of opportunity opened, and Denmark now seems to be on its way to introduce green economic models based on green national accounts, and eventually a Green GDP in policy-making; albeit incrementally and in a way that fits existing administrative procedures and existing economic models.

1. Introduction

The most dominant and influential economic metric across the world is probably GDP (Gross Domestic Product). Developed during the 1930's to measure national income, it was transformed during World War II to allow policy makers to gauge the relative domestic warfare-capacity, armaments-production and the availability of able-bodied men. In the post-war era it has remained a core economic metric in the advanced economies and has gradually been introduced as a statistical tool for macroeconomic planning around the world (Lepenies, 2016).

Already from the very beginning, one of the chief architects of the GDP metric warned against using it as a measure of social welfare (Kuznets, 1934, pp. 5–8). In recent years, criticisms against such use of GDP have re-emerged, focusing among other things on the fact that GDP does not account for environmental externalities and depletion of natural resources. Among multilateral organizations strong calls have been made to move" beyond GDP" to develop and implement new metrics of economic and social performance that better capture intuitions about "successful societies" (e.g. the UN Sustainable Development Goals process, the EU "Beyond GDP" initiative, the World Bank WAVES project, the Stiglitz-Sen-Fitoussi Commission, etc.).

While many of these initiatives to move beyond GDP are relatively new, environmental economists have worked for decades to develop methods to adjust the conventional GDP and its measure of national saving for various environmental effects to arrive at a "Green GDP" and/or a measure of "Genuine Saving" capturing natural resource depletion. Many of the data on physical environmental effects needed for such green national accounting could be drawn from the UN-sponsored System of Environmental-Economic Accounts (SEEA) that several national statistical offices have implemented in recent years as a satelite to the System of National Accounts (SNA) on which the conventional GDP is built. Despite these efforts, the traditional GDP remains dominant and the central statistical tool for governments and international organizations when evaluating economic performance and planning economic policy.

The purpose of this article is to analyse why – in spite of long-standing public concerns about environmental degradation – the conventional GDP has not yet been supplemented by a "Green GDP", and why policy makers – if they are hesitant to embrace a Green GDP due to the difficulties of valuing non-market environmental services – seem to make so little use of the physical environmental indicators in the SEEA satellite accounts.

In order to understand this puzzle we will combine two theories rooted in Political Science dealing with how institutional change takes

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place and apply them to the case of Denmark; a country widely recognized as a green front-runner (Hoff, 2017; Sørensen, 2020), and therefore a likely candidate for integrating green national accounting in political-administrative decision-making. Thus, we will combine Kingdon's (2011) approach to changes in public policy, in which the concepts of 'policy window' and 'policy entrepreneurs' are central, with Mahoney's and Thelen's (2010) theory about incremental, endogenous institutional change which introduces the concepts of displacement, layering, drift and conversion. Using this theoretical framework, we identify a number of barriers that make a transition towards green national accounting very difficult. However, with the advent of a new Danish government in 2019 a 'window of opportunity' opened, and Denmark now seems to be on its way to introduce green economic models and eventually a Green GDP in policy-making; albeit incrementally and in a way that fits existing administrative procedures and existing economic models.

2. Background: Green national accounting and the Green Net National Product

To substantiate our claim that the analytical tools for contructing a Green GDP do in fact exist, this section offers a brief overview of some key findings in the Environmental Economics literature on green national accounting. An interesting early attempt to adjust the conventional GDP for natural resource depletion and other factors relevant for welfare was made by Nordhaus and Tobin (1973), but the theoretical foundations for calculating a Green GDP – more precisely, a Green Net National Product – were laid by an environmental economics literature that took off around 1990, with the studies by Repetto and Magrath (1988), Hartwick (1990), Mäler (1991), Pezzey (1992) and Hamilton (1994) representing some of the pioneering contributions.[2]

Just as the conventional measure of Net National Product[3] (defined as GDP minus depreciation of fixed capital assets plus net income from abroad) is the sum of consumption and net saving as measured in the traditional national accounts, an economy's Green Net National Product (GNNP) is the sum of an extended measure of consumption and an extended measure of saving (Pezzey and Toman, 2002, *sec*. 3.3.3). The extended measure of consumption includes the consumption of conventional goods and services recorded in the national accounts plus the estimated value of the flows of various environmental services assumed to have a direct impact on consumer welfare (e.g. the amenity values of renewable resources like forests and protected areas) and minus the estimated welfare costs of emissions of various pollutants. The extended measure of saving is usually referred to as "Genuine Saving" or "Adjusted Net Saving" in the terminology of the World Bank (2018). Genuine Saving (GS) encompasses investment in man-made capital (including net foreign assets) as well as investment in natural capital. Investment in natural capital is negative if the stocks of renewable and non-renewable natural resources have been depleted through extraction of raw materials.[4] The value of natural resource depletion is calculated as the marginal resource rents multiplied by the physical changes in the relevant resource stocks. In recent years scholars have applied these accounting principles to estimate time series for GNNP for, e.g., Scotland (Pezzey et al., 2006), Portugal (Mota et al., 2010), Malaysia (Vaghefi et al., 2015), and Puerto Rico (Wu and Heberling, 2016).

Most of the rich theoretical literature on green national accounting has focused on the use of GNNP and GS as indicators of sustainability. Definitions of sustainability abound in the social science literature, but in Environmental Economics development is usually considered to by sustainable if the welfare of the average citizen is non-declining over time, in line with the concept of sustainability suggested by the UN World Commission on Environment and Development (1987). In formal models, "welfare" is often measured as the present value of the current and future utility of the representative consumer (e.g., Arrow et al., 2004). Scholars working in this tradition have found that, under certain strong assumptions, development in a market economy is unsustainable if Genuine Saving is non-positive or, equivalently, if the growth rate of GNNP is non-positive. The assumptions underlying these results are that 1) Welfare (utility) depends on the consumption of conventional goods and on the consumption of environmental goods, and 2) Markets are competitive and all externalities have been fully internalized via appropriate (green) taxes and subsidies.[5] Assumption 2) is obviously problematic, since a main reason for concern about the environment is that environmental externalities are often *not* fully internalized. However, in an important paper Dasgupta and Mäler (2000) showed that even when markets are distorted and the economy does not follow an optimal growth path, the direction of change in the GNNP will still indicate whether a policy reform improves social welfare, provided that the GNNP is measured using the "correct" shadow prices reflecting the true scarcities of (environmental) goods and assets.

This finding by Dasgupta and Mäler suggests that GNNP does have some relevance as an indicator of welfare, but many contributors to the literature on green national accounting have pointed out that we do not need to calculate the GNNP if we are only interested in evaluating whether development is sustainable (see, e.g., Dietz and Neumayer, 2007, Dasgupta (2009), Hanley et al., 2015). We only need to estimate the economy's Genuine Saving and track its evolution over time to check if development is sustainable. Still, in contrast to GS, GNNP includes the consumption value of environmental amenities and "cultural" ecosystem services which is of interest in itself, and since GS is an important component of GNNP, the process of calculating the latter provides information on the former.[6]

GS and GNNP are only indicators of "weak" sustainability; a concept assuming that man-made and natural capital are substitutes. Ecological economists are critical of this assumption, arguing that the two forms of capital are typically complements, and advocating "strong sustainability" which requires that the stock of natural capital be non-declining (e.g., Daly, 1990; Costanza and Daly, 1992). But since investment in natural capital is one important component of GS which in turn is part of GNNP, tracking the evolution of the various stocks of natural capital in their physical forms and estimating their combined value in monetary terms is a necessary part of estimating GNNP, so the process of calculating GNNP should allow one to evaluate whether society meets the criterion of strong sustainability.

The calculation of GS and GNNP requires estimating shadow prices of non-marketed environmental goods and assets. This can be done by drawing on methods developed in the large literature on valuation of such goods and assets (see, e.g., Freeman, 2003, Barbier and Hanley, 2009, Barbier, 2011). All of these methods have their shortcomings, so the valuation of nonmarket goods and assets remains controversial. It is

[2] Space only allows us to mention a few key contributions to this literature. For comprehensive surveys, see Aronsson et al. (1997), Hanley (2000), Asheim (2003), Aronsson and Löfgren (2010) and Hanley et al. (2015).

[3] What was previously for many years termed "Net National Product" (NNP) is nowadays termed "Net National Income". We stick to the earlier terminology which was used when the theory of green national accounting was developed.

[4] When used to evaluate whether development is (weakly) sustainable, Genuine Saving also includes human capital accumulation and "the value of time" which is an estimate of the value of (exogenous) technical progress. However, these non-environmental items are not our focus of interest here.

[5] When GNNP is used as an indicator of sustainability, a further technical assumption is that the utility function can be approximated by a linear function (Hanley, 2000, *sec*. 2) or that a so-called Divisia price index with certain ideal properties is used to express GNNP in real prices (Asheim and Weitzman, 2001).

[6] Moreover, from our interviews with Danish policy makers we have the impression that, because of their familiarity with the conventional GDP, they can more easily relate to the concept of a Green GDP than to the somewhat abstract concept of Genuine Saving.

therefore understandable that the statisticians producing the official national accounts have been reluctant to undertake "green" adjustments to the conventional GDP, although some statistical agencies do in fact offer such adjustments.[7] However, governments in advanced economies typically require that planned public investment projects be subject to a cost-benefit analysis that normally includes a valuation of environmental effects, so the same valuation principles could presumably be adopted to produce a GNNP and/or an estimate of GS. Alternatively, governments could rely on the World Bank estimates of Adjusted Net Saving (just another word for GS) in their evaluation of economic performance.

Furthermore, a lot of statistical agencies are now producing environmental satellite accounts to the conventional national accounts, guided by the principles of the SEEA. These satellite accounts (henceforth denoted green national accounts, GNA) record the emissions of important pollutants and a number of other environmental effects of the economic activity reported in the standard national accounts, typically expressed in physical terms. Since most targets for environmental policy are also expressed in physical terms, policy makers who are hesitant (perhaps sometimes for good reasons) to engage in explicit monetary valuation of environmental goods and assets could choose to use the GNA data systematically in the planning and evaluation of economic and environmental policy by tracking the evolution of important (non-monetary) indicators of environmental quality. Thus the GNA could be valuable for decision-making even if they are not used to calculate GNNP or GS.

Despite these facts, governments around the world typically do not integrate green national accounting and GNA data in any systematic and consistent way in their planning of macroeconomic and industrial policy, despite the widespread and growing concern about environmental degradation and climate change. In the following sections, we will draw on insights from Political Science in an effort to explain this puzzle. Our analysis suggests that the GDP concept can – and indeed should be - analysed as something more than merely a neutral scientific description of an objective economic reality. Rather, we propose to study the GDP indicator as a complex, dynamic and contested economic institution, with profound implications for the distribution of political and economic opportunities, power and privilege (Fioramonti, 2013; Coyle, 2014; Mügge, 2016). As an institution, GDP does not only describe and highlight certain circumscribed aspects of economic reality at the expense of others. By so doing, it also puts pressures and constraints upon social, political and economic actors to behave and strategize in certain ways rather than others (Campbell, 2004).

3. Theoretical framework

To understand why the conventional GDP appears to be such a stable institution despite the many criticisms raised against it over the years, we need a theory that can explain when and how institutional change takes place. Within the institutionalist tradition in Political Science there are two fundamentally different approaches to explaining how such change takes place. One approach focuses mainly on change as incremental and suggests that institutions sometimes change as a consequence of *endogenous* processes – i.e. the internal inconsistencies and contradictions embedded in an institutional arrangement that might produce stability in the short-term but nonetheless – gradually and incrementally – undermine and hollow-out the institutional structure over time (Schneiberg, 1999; Thelen, 2000; Hacker, 2005; Djelic and Quack, 2003). Other scholars within the institutionalist camp have held that institutional arrangements are indeed very stable structures which evolve along "path-dependent" lines (Pierson, 2000; North, 1990; Dietz and Neumayer, 2007) and merely change in the rare event of a so-called 'critical juncture'; i.e. a certain historical moment where the institution is struck by an *exogenous* shock or crisis. A shock can momentarily relax the constraints that the institution imposes upon actors and thereby open up room for re-negotiation, re-configuring and thus change of the rules of the institution (Krasner, 1984; Haydu, 1998; Thelen, 1999; Campbell, 2004, 2010). However, what is seldom considered in institutionalist theory is that actual public policies might develop as a combination of these processes, where incremental change is suddenly boosted or changes track due to an exogeneous 'shock'. Seeing such development as likely when it comes to change in the GDP institution, we will therefore combine two theories; the theory of incremental, endogenous change as set out by Streeck, Thelen and Mahoney (Streeck and Thelen, 2005, Mahoney and Thelen, 2010), and a theory of sudden exogenous change as set out by Kingdon (2011).

The approach by Streeck, Thelen and Mahoney combines insights from sociological, historical and rational choice institutionalism and opens theoretical room for the influence of actors upon institutional change. Opportunities for agency-based change are, however, constrained by distinct generic features of the institutions in question.

In accordance with theoretical convention, Streeck and Thelen define an institution as a set of formal or informal "rules stipulating expected behavior and 'ruling out' behavior deemed to be undesirable." Furthermore, they argue that "the enactment of a social rule is never perfect, and that there always is a gap between the *ideal* pattern of a rule and the real pattern of life under it." That is, they introduce an ontological distinction between how the rules of an institution are *ideally* presented and perceived by and between social actors, and the extent to which actors *really* act and behave in accordance with stipulated or taken-for-granted institutional rules. Thus, while institutions according to Streeck and Thelen merely establish the "outer bounds" of socially accepted and expected behavior, there is "room for interpretation" and "a significant amount of 'play'" with regard to how actors actually abide by and conform to institutional rules and norms. Or as Mahoney and Thelen say:" *We argue that institutional change often occurs precisely when problems of rule interpretation and enforcement open up space for actors to implement existing rules in new ways. Expanding our focus to include these concerns allows us to observe and theorize forms of incremental change that are routinely overlooked in most institutional analysis."* (2010, p. 44). Streeck, Mahoney and Thelen argue that these forms of incremental change in turn come in four distinct varieties. The first type is termed displacement and happens when new institutions are introduced and directly compete with (rather than supplement) an older set of institutions. In processes of institutional displacement, some actors first articulate competing and contrasting ideals or logics of social behavior that are in explicit opposition to the existing idealized representation of institutional rules and norms. Following this, other social actors gradually defect and begin to conform their social behavior to the ideals ingrained in the new institutional setup.

The second type of gradual institutional change is so-called layering, where institutional entrepreneurs according to Streeck, Thelen and Mahoney work from within the existing system by adding new rules on top of or alongside old ones. That is, additional interpretations of the ideal institution that prima facie appear as congruent continuations of institutional rules, but however set in motion *real* behavioural adaptations and adjustments that over time gradually disturb institutional equilibria, engendering an alteration of the institution.

A third type of change identified by the authors is the process of institutional drift. Here actors abstain from taking timely precaution to reinterpret and re-invigorate the ideal imperatives of an institution in light of (slow-moving, creeping) changes in the external environment surrounding the institution. Thus, while the institution continues to be

[7] For example, the UK Office of National Statistics reports GDP adjustments for forests, outdoor recreation and carbon as two sets of parallel accounts – environmental accounts and natural capital accounts. As the home country of many influential environmental economists who have sometimes acted as successful "policy entrepreneurs", the UK apparently has a strong "green knowledge regime" (see sections 3 and 4 for an explanation of these concepts) which may explain why the UK is a frontrunner in this area.

articulated in similar ideal terms, the real pattern of life within it – the specific implementation of the rules begins to change.

Fourthly, Streeck, Mahoney and Thelen also identify conversion as a distinct process of gradual institutional change. In this case, "rules are formally the same, but interpreted and enacted in different ways. The gap is produced by actors who actively exploit the inherent ambiguities of the institutions. Through redeployment, they convert the institution to new goals, functions, or purposes." (Mahoney and Thelen, 2010).[8]

On the basis of this fourfold typology of mechanisms of institutional change, Mahoney and Thelen argue that some types of institutional change are more likely to occur in some types of institutions rather than others. In short, institutional change in general and the type of institutional change in particular is contingent on the particular features of the institution in question.

On the one hand, institutional change depends on the range of veto possibilities in the external political environment of the institution in question. An institution can never be seen in splendid isolation; it always has complex and multidimensional relationships with the outside political world. The scope for institutional change depends on the answers to the following questions: Does the institution in question encompass one or several politically and/or economically resourceful, influential and strong veto players, or is the opposition to change weak or scattered? And what scope for discretion and interpretation does a given institution leave to agents when they act to comply, monitor and enforce the rules of the institution? In short, the relative scope for discretion in the interpretation of institutional rules as well as the veto possibilities available to internal or external opponents of institutional transformation condition what form of gradual change an institution might undergo (Mahoney and Thelen, 2010). In particular, whether conversion, displacement, layering or drift is most likely to occur depends upon these two endogenous features of the institution in question (see Table 1).

As an institution the GDP-indicator is probably best described as a set of formal and informal rules that allows rule-followers a low degree of discretion and independence of interpretation, inasmuch as there are very strict and enforced statistical guidelines for how the metric is measured, as illustrated by the 722 pages long SNA rulebook. While the calculation of GDP is a complex process, and while structural economic change sometimes calls for a reinterpretation of or change in the rules and calculations, these efforts are to a high degree monitored and controlled by international organizations such as the UN, OECD, IMF, the European Commission, national ministries, the academic community, etc. Furthermore, GDP is an institution which stands in a very close and intimate relation with the external environment that allows a great many, very different, and politically very strong veto players several inroads and possibilities to block change.

This is not to deny that significant changes to the principles for calculating GDP do sometimes take place. Perhaps the most important example is the change in the guidelines for the treatment of financial intermediation services introduced in SNA 1993, which consolidated the view that such services represent a productive activity. Yet, as described by Christophers (2011), many important countries (including the UK with its large financial sector) only implemented the new guidelines in their national accounts with a long time lag stretching into the current millennium.[9]

However, although the political context in which an institution like GDP operates might seem stable or strong at a certain point in time, we also know that the political agenda sometimes changes very rapidly. An issue may suddenly "catch on" or "take off" in ways that were not anticipated just months earlier, and it may produce rapid change in public policies or programmes that everyone thought were stable or untouchable. In Kingdon's study of a number of policy programmes he finds that there are at least as many non-incremental as incremental changes (Kingdon, 2011, p.81).

In trying to explain such sudden changes, Kingdon takes his point of departure in Cohen, March & Olsen's "garbage can model" (Cohen et al., 1972). This is a model of decision-making in organizations which sees decision-structures as consisting of four separate streams: problems, solutions, participants and choice opportunities. Each of these streams has a life of its own, largely unrelated to the others. Thus, organizations are seen as a form of organized anarchy in which "a collection of choices (is) looking for problems, issues and feelings (are) looking for decision situations in which they might be aired, solutions looking for issues to which they might be the answer, and decision makers looking for work" (ibid:2). A choice opportunity is "a garbage can into which various kinds of problems and solutions are dumped by participants as they are generated" (ibid.), and the question of whether an outcome or decision is actually produced depends on which solutions are ready for airing, and whether they fit with the problem at hand.

Kingdon uses a revised version of this model to understand the development of a number of federal policy programmes in the US. He identifies three different types of processes in federal government agenda setting: problems, policies and politics, which are roughly comparable to the streams described by Cohen, March & Olson. Like in the garbage can model these streams develop and operate largely independent of one another and only come together or couple at critical times. Problems are items on the political agenda which capture the attention of people in and around government, policies are the proposals generated by the community of policy specialists (the "knowledge regime" (see Campbell and Pedersen, 2014) encompassing bureaucrats, MP's, interest groups, researchers, etc.) and the political stream is composed of things like swings of the national mood, vagaries of public opinion, election results, change of government, shifts in coalition patterns in Parliaments, and interest group pressure campaigns (Kingdon op.cit.:87).

The opportunities arising when the separate streams can join to produce a decision are labelled as "policy" or "problem" windows by Kingdon. Such windows basically open because of a change in the political stream (e.g. a change in government) or because a new or compelling problem captures the attention of government officials and those close to them (ibid:168). Based on his own research, Kingdon also posits that when a window opens, it does not stay open very long. An idea's time comes, but it also passes. When politicians adopt a given theme for their administration like for example" green transition", as the current Danish government, and start to develop policies that will serve this end, they reach into the policy stream for proposals. However,

Table 1.
Contextual and institutional sources of change.

		Target institution	
		Low level of discretion in interpretation/ enforcement	*High level of discretion in interpretation/ enforcement*
Political context	*Strong veto possibilities*	LAYERING	DRIFT
	Weak veto possibilities	DISPLACEMENT	CONVERSION

Source: Mahoney and Thelen, 2010:28.

[8] The "gap" referred to in this quotation is the deviation between the formal rules and the way they are actually used.

[9] Christophers (op.cit.) suggests that the new and more "banker-friendly" SNA 1993 guidelines reflected in large part the political influence of the financial sector, but his analysis also shows that even such a powerful interest group cannot necessarily enforce a quick change in the actual functioning of the GDP institution.

problems, proposals (policies), and politics are not automatically coupled. It takes what Kingdon calls "policy entrepreneurs" to make this coupling (ibid: 179ff). Policy entrepreneurs can be found in many locations and are not necessarily part of the formal political system. They can be ministers or MP's, career bureaucrats, lobbyists, academics, members of think tanks, journalists, etc. or any combination of these. However, what is typical for policy entrepreneurs is that they have some claim to a hearing; typically for one of three reasons: they have a recognized expertise concerning the problem in question, they have an ability to speak for others (as for example leaders of powerful interest groups), or they have authoritative decision-making positions. So, policy entrepreneurs play a central role in coupling the streams when the policy window opens, and without the presence of (a group of) entrepreneurs, the coupling of the streams may not take place. As will be clear below in our methods section below, it is exactly such a group of policy entrepreneurs we have tried to target in our interviews.

Summing up, we have presented two different models of change; one focusing explicitly on the institution to be changed (here the conventional GDP), and another focusing on the political context in which such change takes place. Table 1 above can be seen as a combination of these two models, and as stated above the character of GDP as an institution suggests that change will take place as either layering or displacement. Furthermore, as the policy field within which GDP and its alternatives are discussed and eventually implemented is characterized by many different and politically strong veto players, we expect layering rather than displacement to be the most like way in which change will take place. In the empirical analysis below we will see whether this is in fact the case.

4. Method

In order to analyse which type of incremental change – if any – is occurring to supplement the traditional GDP measure with one or more "beyond-GDP" measures, we are using Denmark as a case in point. As part of the research project "Developing and implementing green national accounts and the green GDP", some of us have produced a report (Rasmussen et al., 2018) dealing especially with the barriers against such development.[10] The report as well as this article is based on two types of data. Inspired by Oosterhuis, van der Esch & Hoogervorst (2016) and Malay (2019), the first type of data is a content-analysis of reports and articles from both stakeholders and academics dealing with the relationship between statistical data and politics in general and more specifically with why it is so difficult to introduce "Beyond-GDP" metrics in political decision-making.

The second type of data are interviews with stakeholders who are or have been directly involved in the transmission of green statistical data into politics (policy entrepreneurs), or are or have been central observers of this relationship for considerable periods of time. More specifically, these data consist of twelve so-called "expert interviews" with policy entrepreneurs or other central actors in the "green knowledge regime"[11] in Denmark. Apart from the twelve expert interviews we also did some pilot-interviews as well as some background interviews with persons who wanted and were granted full anonymity. The twelve respondents were names on an original list of around 30 potential interview-persons who all hold central positions in the green knowledge regime in Denmark. In creating this list, we tried to include the environment- and climate policy spokespersons from political parties represented in the Danish Parliament, civil servants from the economic as well as other relevant ministries as well as a broad spectrum of persons from different interest organizations. Our ambition was to create a sample with a broad and diverse representation of views and ideas, thereby striking a balance between these. However, as we ended up with only twelve interviews, the range of views expressed may not be fully representative. It was particularly difficult to get interviews with spokespersons/ministers from the (now former) centre-right government which might give the analysis a bias in the direction of views from the centre-left parties.[12]

The interview questions focused mainly on identifying barriers to the use of the green national accounts (GNA) produced by Statistics Denmark in administrative and political decision-making. The GNA include data on the physical changes in the stocks of the most important Danish exhaustible and renewable resources, physical use of various sources of energy, emissions of the most important air and water pollutants, material flows throughout the economy, the volumes of various types of waste, public and private expenses on pollution abatement, and the turnover (in monetary terms) from various activities in the national accounts deemed to represent "environmental goods and services". The interviews revealed that the respondents had varying degrees of knowledge of the specific data included in the GNA, ranging from fairly detailed to rather superficial knowledge. The interview questions did not suggest that the GNA should necessarily be used to calculate a Green GDP, let alone that the conventional GDP should be replaced by a Green GDP, but as reported below, some respondents did in fact state (on their own initiative) that such a development would be desirable.[13]

All interviews were done as semi-structured interviews lasting around one hour, and carried out on the basis of the same pilot-tested interview-guide. All respondents were offered some anonymity in the sense that they were offered to express their views without citation (microphone shut) and only to be used as background information. Several of our respondents used this opportunity. All interviews were recorded and transcribed. The transcribed interviews were coded using a semi-open qualitative coding strategy, where the central categories, distinctions and definitions in the interview-guide were used as focal points, but where the authors were also open to the appearance of new themes, and to creating new codes for these.

In order to ensure a high intercoder reliability, all 12 interviews were coded independently by two different coders. Based on this coding the analysis below attempts to identify, describe and map the (potential) barriers against the use of green national accounts (in their current form as satellite accounts to the traditional national accounts reporting mostly physical environmental effects as well as barriers to the use of monetary metrics such as GNNP and GS) as seen by the central actors in the green knowledge regime in Denmark. Thus, the ambition has not been to identify "objective" barriers, but rather systematically to map how (potential) users of green statistical data perceive the "typical" barriers for using such data.

5. Empirical analysis

In our analysis we have come across three different types of barriers

[10] The research project" Developing and implementing green national accounts and the green GDP" is funded by the KR Foundation and the Carlsberg Foundation. It runs from 2017 to 2021 and involves a number of juniour and senior researchers from the University of Copenhagen as well as analysts from the Danish Research Institute for Economic Analysis and Modelling and from Statistics Denmark. See www.dst.dk or www.susy.ku.dk

[11] "(A knowledge regime) is the organizational and institutional machinery which generates data, knowledge, policy recommendations and other ideas that affects the public debate and policy-making". Campbell, J.L. & Pedersen, O.K. (2014), *The national origins of policy ideas: Knowledge regimes in the United States, France, Germany and Denmark*. Princeton University Press, p. 6.

[12] A full list of the interview persons is found in the appendix.

[13] The conventional GDP remains a useful indicator of economic activity for several purposes, and among other things it is used in the EU as a basis for calculating contributions to and certain payments from the common EU budget. Thus this article does not suggest that the conventional GDP be replaced by a Green GDP, but only that the integration of some form of green national accounting in policy-making would be a valuable supplement to the use of GDP.

which we have called *analytical barriers, processual barriers* and *actor barriers.* We have divided the analytical barriers into internal and external analytical barriers.

5.1. Analytical barriers

Internal analytical barriers exist when respondents perceive that the Danish GNA based on the SEEA guidelines are constructed in an unsatisfactory way. Several users perceive the statistical classifications and definitions as faulty or misleading; hindering the use of green national accounts as a proper basis for decisions concerning environmental and climate policy. Thus, internal analytical barriers refer to statistical "construction errors".

External analytical barriers refer to situations where respondents miss a "translation" of the data in the green national accounts into other types of environmental analysis. For these respondents the GNA are a necessary, but not sufficient prerequisite for qualified and informed political decision-making concerning environment and climate.An example of an internal analytical barrier comes from the head of the statistical department in the Danish Agriculture and Food Council, the main lobby organization for Danish agriculture, who criticizes the definition of "green" used in the GNA. He notices that some goods and services are classified as green due to their use, while others are classified as green due to the way they are produced. Windmills for example are classified as green due to their use, while for example ecological agriculture is classified as green due to its way of producing goods. According to him this obscures the picture of how "green" certain sectors appear in the GNA and portrays some sectors in an unjustified negative way, for example Danish agriculture. For him this represents a barrier for the further use of the GNA.

Other examples of internal analytical barriers come from a head of office in the Economic Councils (an independent advisory body to the Danish government) and a CEO in The Confederation of Danish Industry (the main industrial lobby). They both point out that the publications from Statistics Denmark based on the GNA typically have a national focus meaning, e.g., that they do not include estimates of carbon leakage, carbon footprints, ecological footprints etc., and that the possibilities for a disaggregation of these data are often limited. This is seen as a potential barrier as some environmental problems are of a very local nature, and as a detailed analysis of certain industry sectors is needed to obtain knowledge about for example the effects of green taxes on highly emission-intensive firms.

Examples of external analytical barriers fall into three types. The first type is the necessity of "translating" the data in the GNA into a Green GDP or green economic models in order to be really useful for political decision-makers. This is pointed out by several respondents, for example one of the CEOs in The Confederation of Danish Industry who finds that the lack of a Green GDP is a barrier for using the GNA, and also means that GNA are not used as a point of reference among political decision-makers in Denmark. Obviously, such an attitude cannot be characterized as a barrier against green national accounting in general, but rather as a call for its further development. However, such further development is hampered by the fact that there are so far no international standards for how the conventional GDP measure should be adjusted in order to provide a green GDP. This point is stressed by a former head of the secretariat of the Danish Climate Council who says that: *("Even though) a lot of work is going on internationally in terms of developing and re-interpreting the GDP concept, moving it in the direction of a green GDP, it is not yet developed to a state where we can write off the traditional GDP and replace it …….. we are not yet at a stage where GDP is 'out'".*

The current economic models used in the central economic ministries represent a second type of external analytical barrier. According to quite a few of our respondents these models are seen as an implicit barrier against the use of the GNA in a relevant way. Connie Hedegaard, former Danish Minister for the Environment and Climate and former EU Commissioner for Climate, points to a certain inertia in Danish public administration when it comes to incorporating measures concerning environment and climate in the existing economic models, as civil servants apparently fear that this will make the models too big and unworkable. However, as we shall see below, the new government which came into office in June 2019 has an agreement with its supporting political parties that explicitly promises to introduce new green economic models in the central economic ministries exactly to incorporate environmental and climate considerations in macroeconomic planning and economic policy evaluation. A third type of external analytical barriers is that in order to undertake environmental cost-benefit analysis and/or calculate a Green GDP, it is necessary to assign monetary values to many of the physical environmental effects which are reported in the current GNA based on the SEEA system. Quite a few of our respondents find it necessary to carry out an economic valuation of physical environmental effects before the GNA can be used in environmental and climate analysis, and thus as a part of political decision-making. While this is a barrier to the use of the GNA in their current form, it is clearly also a call for further development of green national accounting in Denmark.

5.2. Processual barriers

Processual barriers arise when different types of professional-administrative and/or political-ideological demands on environmental- and climate policy analysis prevent the use of the statistics and data recorded in the GNA. In our interviews two themes appear quite often. The first theme concerns the division of work between politicians and civil servants. The second theme relates to the calculation principles used when producing the basis for decisions in the field of environment and climate policy.

In relation to the first theme a number of respondents refer to an accepted division of work between politicians and civil servants where Parliament sets the overall political goals while civil servants analyse which policy instruments can be used to attain these goals at the lowest possible social costs. Thus, if an "objective" cost-benefit analysis from the civil service indicates that some environmental policy intervention is not socially worthwhile, politicians should not insist on implementing it. However, not all respondents subscribe to this idealized description of the division of work between government and the administration. Some find that the civil servants at times work against certain political goals or on their own produce proposals that reformulate or add to or subtract from such goals. An example is a former Minister of Climate and Energy, now MP, who states that: *"However, there is often a huge 'structural resistance' against setting goals in the area of environment and climate. The Ministry of Finance and many others stubbornly resist setting such goals"*. This resistance seems to be connected to a number of factors among which the question of budgetary discipline might be the most important. The MP goes on: *'There is a strong focus on budget discipline in the short run, meaning that any postponement of expenses is almost per definition a good thing ……. Earlier there was a focus on budget discipline and long term strategic investments. Now it is all about budget discipline'*.

Concerning the second theme some respondents claim that there is a political bias in the calculation principles used in especially the Ministry of Finance which works against some types of political proposals aimed at accelerating the green transition. Allegedly this bias is revealed by practices such as: 1) depicting certain political proposals as more expensive than they actually are, 2) using a short time horizon in policy evaluation so that long term environmental or climate benefits do not get counted, and 3) underestimating the potential negative consequences of not limiting global warming. Thus, some of our respondents perceive a certain reluctance in the economic ministries to account for expected social benefits from green political initiatives when doing the cost-benefit analyses used as a basis for political decision-making. The effect of such reticence is that some (green) political initiatives appear as more costly than they really are, and thus as less politically attractive.

5.3. Actor barriers

Actor barriers can be *direct* as well as i*ndirect*. Direct actor barriers arise when certain political players directly oppose, obstruct or try to hinder that the GNA are used in relevant ways. Indirect actor barriers take the form of the absence of expertise, analytical capacity or resources among existing players that prevent the use of the GNA in a qualified manner.

While our respondents are mostly preoccupied with the indirect actor barriers, the direct actor barriers were very obvious in the first phase of our research project. Thus, due to political resistance from the former centre-right coalition government (2015–2019), the funds for an extension of the work with the GNA in Statistics Denmark were withdrawn. The required appropriation was only reintroduced in the government budget due to a last minute intervention by one of the coalition parties, allowing a continuation of work on the GNA. The current government has now made sure that funding for the GNA will continue, and even made it a priority in the agreement with the supporting political parties.

Concerning indirect actor barriers several respondents point out that, Denmark has a relatively limited analytical capacity and few organizations outside of the central government administration which are able to undertake environmental and climate policy analysis at a sufficiently high professional level. According to these respondents the "green knowledge regime" in Denmark is not as professionally solid and stable as in several neighbouring countries such as Sweden, Norway, the Netherlands, and UK. The impression is that these countries have a relatively larger external (i.e. outside government administration) analytical capacity in the field of environment and climate that enables them to produce more sophisticated analyses which are more qualified, nuanced and pluralistic. Also, many of the non-economic ministries, most of the political parties, and organizations in civil society cannot muster analytical capacity and expertise matching that of the Ministry of Finance. The only organizations that have some analytical muscle in this respect are some of the think tanks, the Economic Councils and The Climate Council.[14]

6. Discussion

From its birth in the 1930s until today the GDP metric can be seen as an extremely stable institution which has resisted many attempts to change it. Due to its impressive amount of rules backed by powerful international institutions, there is a very low level of discretion in making changes to the GDP framework. From our analysis of the barriers to green national accounting in political-administrative decision-making in Denmark, we also conclude that there are many stumbling blocks on the road to introducing 'beyond-GDP' measures in Danish policy making and that strong veto players both inside and outside public administration have been blocking change until now. According to the theory of institutional change developed by Mahoney and Thelen (summarized in Table 1) the combination of low levels of discretion in interpretation and strong veto possibilities points towards *layering* as the mode of change in the use of GDP and related economic models in the part of Danish public administration producing economic analyses for the government. However, as our analysis of barriers has shown, even such a weak form of incremental change has been difficult. The economic ministries, especially the Ministry of Finance, have been reluctant to integrate existing policy goals in the area of environment and climate (for example the goal of a 100% fossil free Denmark in 2050) in their economic analyses, as these analyses are normally short- or medium-term. This time horizon has meant that the long-term costs and benefits of the necessary long-term green investments or initiatives have not found their way into the economic analyses underlying political decisions on economic policy. In the broader political context strong veto players such as especially the former government also blocked the use of GNA and an introduction of 'beyond-GDP' measures in the economic models used by the economic ministries, even though a lifeline was given to the continuation of the work with GNA in Statistics Denmark in the last minute.

With the advent of a new government in June 2019 this situation has changed dramatically. Climate change was the dominant issue at the election on Constitution Day (June 5th) 2019, and in the agreement signed between the new Socialdemocratic government and its supporting centre-left parties after the election it is explicitly mentioned that: *'Considerations concerning climate and the green transition must be integrated in the economic models used by the Ministry of Finance, and development of greener economic models must be secured and broadened. A dialogue with Statistics Denmark on how the work on green national accounts and a Green GDP can be strengthened must be initiated'* ('Retfærdig retning for Danmark', Just direction for Denmark, Political understanding between the Socialdemocratic Party, the Radical Liberal Party, Socialist Peoples Party and the Red/Green Party, p. 5). As a follow-up on this agreement an appropriation of 12 mill. DKK was given to Statistics Denmark to continue the work on the GNA, and more persons were hired to the Danish Research Institute for Economic Analysis and Modelling which is producing economic models for the Ministry of Finance, in order to boost work on an environmental-economic computable general equilibrium model of the Danish economy. Thus, a window of opportunity for change has opened. This window has opened first of all because the political context has changed and the veto players in the former government disappeared. This opens the possibility of institutional change as either displacement or layering. While it remains to be seen exactly how the GNA and the new "green" model of the Danish economy will be used in the relevant ministries, the odds are overwhelmingly that the institutional change will take the form of layering. This first of all because the Ministry of Finance is now itself proactively taking part in developing a new green economic model, which is built to fit existing models, and secondly because an international consensus on how to estimate a Green GDP as such does not yet exist, making displacement an unlikely strategy.

7. Conclusion

This article has analysed why use of the traditional GDP in policy-making has not yet been supplemented in any systematic way by green national accounting that accounts for the environmental and climate effects of economic activity, despite the scientific progress in this area and the growing emphasis on the need to move 'beyond GDP' in recent decades. Drawing on insights from Political Science, the article posits that GDP can be seen as a political-economic institution and then proceeds to explore the character of this institution.

Using a historical institutionalist understanding of institutional change as taking place either as 'layering', 'conversion', 'drift' or 'displacement', we suggest that since GDP is a highly formalized institution with strong multilateral support, changes to the GDP institution will most likely take place either through 'layering' where new rules are gradually added to supplement old ones, or through 'displacement' where a new institution is introduced as a direct competitor to and substitute for an existing institution. To test this hypothesis we undertook a case study of Denmark which is widely seen as a green frontrunner, suggesting that if a move towards green national accounting in public administration and political decision-making is to take place, it is likely to happen in a country like Denmark.

We carried out a series of interviews with central actors and potential policy entrepreneurs in the 'green knowledge regime' in Denmark to identify the barriers to the introduction of green national accounting in policy-making, e.g., via systematic use of the green national accounts

[14] The Economic Councils as well as the Climate Council are both independent (but state financed) expert bodies established in order to advise the government and Parliament on economic and climate policies.

(GNA) produced by Statistics Denmark that mainly report environmental effects in physical terms, and/or via the calculation of a Green GDP or a measure of Genuine Saving. We identified both analytical, processual and actor barriers that all seem to make a transition towards green national accounting very difficult. While we were expecting to find 'layering' as the mode of institutional change, given the low level of discretion in interpreting GDP and the strong veto players both in the political and the administrative sphere, even such endogenous and slow mode of change was hard to identify till 2019. However, with the advent of a new government in June 2019, this situation changed dramatically. Thus, in the agreement signed between the Social Democratic government and its supporting parties it is explicitly mentioned that considerations concerning climate and a green transition must be integrated in the economic models used by the Ministry of Finance and that work on the GNA and a Green GDP must be strengthened. Since the signing of the agreement the Ministry of Finance has supported the development of a green simulation model of the Danish economy, extending a modelling framework that has previously been used by the ministry to analyse the effects of economic policies. This points towards institutional change in the form of layering rather than displacement, as new green economic models are built so as to fit existing models.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ecolecon.2020.106905.

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