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Good or bad credits from European sources? Europe's financial credibility is better than populist credits for wood combustion^{□)}

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ABSTRACT

The paper gives an example regarding the manner, how economical and ecological arguments can be brought together in order

(1) to reject the populist legitimization of the assault of the financial sector on European governance arguing with inevitable tax transfers, and

(2) to remind upon alternatives regarding

(a) possible use of existing, but underused and underestimated EU credit institutions. This institutional archeology is taken from the historical and actual contribution of economist and historian Stuart Holland to thinking about European governance to overcome its flaws;

(b) problematic green technologies and resource uses which should not be credited to be part of the transition to renewables. This argument is developed from a critique of Danish policies as seen from the view of grass roots and scientists cooperating to restrain the backward step from fine-tuned fossil fuel use in dense settlements to noxious applications of more polluting, less energy efficient and actually also more CO₂-emitting forms of combustion of biomass. An accounting model used by the State administration of Massachusetts for discussing time-profiles for renewable forestry and wood combustion substituting the combustion of fossil fuels will be discussed. A perspective of likely impacts of climate change on forests is added in order to counteract the timeless 'truth' of 'CO₂-neutrality' as applied to the combustion of forest products leading to wrong incentives and to investments into false renewables.

1. RELEVANCE FOR EUROPE OF A NEW DEAL DEBT ACCOUNTING MODEL

When drafting a Constitution of Europe, former French president Giscard d'Estaing did not see any meaning in describing the role of the European Investment Bank (EIB) in other than archival terms:

”The draft Constitution left reference to the role of the EIB under ‘Other Institutions’ some hundred pages later after a section stressing the independence of the European Central Bank and neglecting to stress that the European Council can set guidelines for economic policy that it

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is Treaty bound to support. Until its very last draft only weeks before publication the text on the EIB had been lifted without amendment extant from the Rome Treaty, even being in the future tense since in 1957 when the Treaty was signed, a European Investment Bank did not yet exist. No recognition was made that it had a remit following the Amsterdam Special Action Programme and the Luxembourg and Lisbon European Councils to invest in health, education, urban renewal and the environment, or to promote new technology and innovation." (Holland 2010b, 13).

The proportional role of the EIB in international loan-giving – in 2008 it emitted ten times more international loans than the World Bank (Holland 2010c) – has also seldom been recognized. The existence since the 1990s of a European Investment Fund (EIF) has completely been neglected. Together with the EIB, it could otherwise be used to make the EU an example of what Stuart Holland proposed as a regionalised Bretton Woods financial architecture for a multi-polar world (Holland 1994).

Even in political science, the EIB is a neglected theme, as Nick Robinson recently has brought into discussion, comparing it with the earlier fate of the European Court of Justice, which went unnoticed quite a time after its establishment (Robinson 2009). With 70 bn. Euro today (Holland 2010b, 10) the EIBs volume of annual loans lies almost in the same order of magnitude as the financial aids thrown after failing banks in recent years – with the difference that the EIB is an example of better accountancy.

The irony of world history is, however, that – instead of using the rational potential of European institutions - a new construction of a European Monetary Fund is presently discussed in terms of restrictions akin to what already was contained in the original Stability and Growth Pact of 1997. As Jesper Jespersen of Roskilde University has argued (Jespersen 2010), this is a clear case of monetarist domination of the institutions of the Monetary Union. Indeed, a spirit of axiomatic dogmatism has shown its head in crucial moments of history - as e.g. in December 1993 at the Eco-Fin council meeting in Edinburgh, when German finance minister Egon Waigel first rejected the idea of issuing Euro-bonds with the short-sighted argument that it would be counterproductive to allow the EU an expansionary financial policy at the same time, when member states should live up to the restrictive criteria of the Maastricht treaty. Monetarists and their political adherents apparently don't fear the deflationary effects of cutting public expenditure, when it comes to national debt exceeding 60% of GDP or continued periods with more than 3% budget deficit. After the recent financial breakdown and huge expenditures to bail out the banks, the practical wisdom

not to implement the draconic sanctions implied in the Growth and Stability Pact of 1997, apparently is overridden by an extra impetus to reinforce them in practice.

Monetarists simply ignore the knowledge on regional disparities, which since the 1970s has been accumulated in the literature on Western Europe (see e.g. Hugh Clout 1975, 1976) and which has assumed new dimensions with each round of enlargements until now, where 500 million inhabitants are registered as inhabitants of the EU. Already at the foundation of the European Community this market fundamentalist attitude was outspoken in the assumption that regional disparities (as well as unemployment) only are transitional phenomena, because the market with an inherent central tendency to equilibrium will regularly work for narrowing divergences. The respect for regional disparities was so limited that the establishment of the European Investment Bank with its remit to "provide loans to help the 'balanced and smooth development of the Common Market'" (Clout 1976, 12; note the euphemism worth of Chinese diplomacy) only found its way into a protocol to the Rome Treaty: "It thereby had not been headlined that while the Union itself could not borrow, its investment bank could" (Holland 2010c, 8) which encouraged the perception that anything financed by EEC/EU was taken from taxpayers rather than, as in the US New Deal, could shift savings into investments.

On the advice of Stuart Holland, whose report of 1993 to the Delors Commission on economic and social cohesion clearly demonstrated his understanding of spatial dynamics within the Community, the Delors presidency was then clear to use Euro bonds as the financial instrument for investments of common interest for both widening and deepening integration. For productive investments restructuring the economic landscape of Europe, the creditworthiness of the EU Commission and the member states in combination might be used - with high power to attract cofinancing on markets (leverage), low rent levels and a minimum of tax payer money – to finance investments from capital markets and, thus, to convert private savings into public regional and local improvements.

The problem of economic and social cohesion in Europe could have been eased in this way, because an essential part of those socially and politically prioritised investments could have been financed by low-rent loans from the EIB and EIF - without necessarily posting the costs on national accounts. This model of financing investments of common interest would not have implied financing via national tax increases, as Helmut Kohl argued at a meeting of the European Council in 1995 (Holland 2010b, 9). In 1997, even chancellor Kohl dropped his resistance against Euro bonds and opened, thus, the way to use the EIB for investments in health, education, urban renewal,

the urban environment and technology and innovation (Holland 2010b, 9). If this would have been done earlier, the costs of German re-integration of East and West could have been offset for Germany itself (Holland 1993).

That the costs of investments of common interest would not count on the national debt of member states is a way of accounting which president Roosevelt introduced in 1933, when he let the U.S. Treasury issue bonds for federal investments which would not count on state budgets of say California or Massachusetts (Holland 2010a,b). To find an equivalent mechanism, Europe does not need further steps of integration. It only needs a decision by the European Council to set aside the actually restrictive EIB rule of member state co-financing – which would be appropriate given the seriousness of the present crisis. The European Central Bank is obliged not only to respect or take account of such guidelines but to support any 'broad guidelines of economic policy' agreed by the European Council by the terms of its constitution, modelled on that of the Bundesbank. It provides that, without prejudice to safeguarding the internal and external stability of the currency, it should support the 'general economic policies of the Union'. At the present and for the foreseeable future, there is no risk of inflation but the risk of a weakening of the Euro - if governments do not show that they can strengthen the Eurozone by making a reality of their nominal commitment to a European Economic Recovery programme and issue the Union Bonds proposed by Jacques Delors. They could thereby attract purchases by surplus emerging economies and hedge funds. While the ECB would continue to be "the guardian of stability, the European Investment Bank could safeguard employment and sustainable growth" (Holland 2010 b, 14).

In the dominating answer to the financial crisis since 2008 - to bail out the banks -, sustained credit is, however, given to democratically not legitimated Credit Rating Agencies which were some of the worst culprits of crisis provoking financial manipulations on the biggest scale – and they are now allowed to decide upon the amount of credit given to elected EU member state governments. This could change, if a politics based upon 'insight and cautiousness' (German: Ein- und Vorsicht) came into high gear in Europe - central codes already in 1864 articulated by Karl Marx for what he called the political economy of the working class – in contrast to the political economy of the bourgeoisie which superficially focusses upon supply and demand, leaving the sphere of production behind the wall of private property (Marx 1864/1975). The social basis for a political economy of insight and cautiousness has to be reconstructed today from what is left of the workers movement and new social movements, especially in the fight against neoliberalist globalisation and its combined social and ecological catastrophies. Regarding the latter, the precautionary principle of

environmental politics has been sidestepped by rhetorical whitewash or by its conversion into 'preemptive' military strikes. This implies a new importance of pluri-dimensional knowledge systems on peace and environment and the need of empowerment of local knowledge to fight wrong solutions for material problems. A case in point is the widespread "accounting error" (Searchinger et al. 2009) of declaring combustion of all biomass for CO₂-neutral, irrespective of the space and time dimensions of real plant growth in different ecological systems.

2. OPPOSING CLIMATE TO ENERGY AND ENVIRONMENTAL POLICIES

In the global centers of fossil-based capital accumulation human neighborhoods have been constructed as more or less densely built-up areas - often with remote nodes of infrastructure for supplies of electricity and/or heat. The replacement of these infrastructures by on-the-spot heating equipment fuelled with stem wood or wood residues from forests means introducing seemingly well-known, but – as is known today – indeed highly toxic equipment. When this process gains momentum as part of policies to substitute fossil fuels and when it is extended by wood fuel use in big scale energy production, both the forest resource base, which often expanded in times of fossil fuel use (RCD 2009a), and public health are threatened.

Health effects of wood combustion are mostly documented from peripheral countries with open-fire wood stoves. But there exists also a body of critical literature on the noxious qualities of wood smoke when released from Your neighbor's chimney, including substantial pollution by particles (even of the finest, most noxious grade), tar (PAH) carcinogens and chlorinated dioxins reinforcing them, to name only a few toxic agents. The spectrum is similar to that of cigarette smoke with more dioxin production added from catalytic processes in chimneys - as in Municipal Solid Waste Incinerators (R.C.-Dupont 2009b).

In the last decade, however, regulatory power e.g. in the state of Denmark has been so reduced in the field of environmental controls, that emergent research on the matter of pollution from wood stoves has been shredded with flawed arguments from climate policy, before its critical results were discussed publicly. A critical example of this is furnished by former Danish minister of the environment, now EU Commissioner of the Environment, Connie Hedegaard. In 2006, Hedegaard underwrote the Danish National Report to the Stockholm Convention (on phasing out persistent organic pollutants, POPs, as e.g. dioxins). Here, some of the world's leading dioxin specialists (regarding small firing applications) had recommended to stop wood stoves without cleansing equipment in order to cure the dioxin problem: They were undercut by outspoken censorship

proposing in the same sentence that such a regulation, however, would counteract the Danish government's goals in climate policy, i.e. to reduce green house gases by 'carbon-neutral' wood combustion even in small, noxious appliances without flue gas cleansing. Several government agencies had revised emission factors of CO₂ for wood smoke from being bigger than those of fossil fuels to be zero (R.C.-Dupont 2009b).

The real world result according to series of measurements, reported by the Danish National Environmental Research Institute to international conventions: Danish emissions of dioxin are now up to levels of the first part of the 1990's, when emissions to air from MSWIs because of EU regulations began to be reduced and converted into toxic waste piles (exported as 'mine stabilisators'). The emissions of dioxins from neighbors' wood stoves have both experimentally and in dense settlement field work been measured as being in the same order of magnitude as the EU limit value for MSWIs - with their much higher chimney outlets, calculated to dilute dioxin air concentrations by a factor of 1000. No responsible authority should evade the issue of public health, which these and similar toxic emission concentrations in wood smoke pose. Based upon clinical knowledge, the Danish Society of Engineers (IDA) has, thus, estimated that public health could be essentially improved, if wood stoves were mostly outphased in a country like Denmark – leading to cut-backs in medical treatment costs in the order of magnitude of half a bn. Euro or nearly 1000 Euro pr. wood stove (IDA 2009).

There has also been emitted more CO₂ from home heating than it would have been done by applying wiser heating technologies and/or better ways of passive solar 'heat storage'. This is, however, concealed by creative book-keeping, saying that an emission factor of zero is applied for air emissions of CO₂ from the combustion of all biomass as a special "effective emission factor" - a creative political construct (Illerup 2009).

This 'effective' emission factor of zero does not exist in physical reality on the spot, but is only effective by virtue of a compensating factor thought to be at work in other places (in the global forests) and all into a distant future (through decades and centuries). An expected future 'income' of compensating photosynthetic activity reducing CO₂ to combustible carbon stored in plant matter is discounted back into a 100% present value – without any deductions for uncertainty - if the project perspective is not completely ruled out by a simple, metaphysical adage saying that the combustion of biomass is CO₂-neutral, because it only emits the same amount of CO₂, as plant growth has bound previously (which also applies for fossil fuels). But, as physicist Bent Sørensen has written in

his seminal work on “Renewable Energy”, there is an important exception to the rule of CO₂-neutrality for the combustion of biomass: “the *time lag for trees* may be decades or centuries, and in such case the temporary carbon dioxide imbalance may contribute to climatic alterations.”(Sørensen 2000, 477, italics red)

Today, more knowledge has been accumulated to know that the combustion of stem wood is not part of a solution, but part of the global warming problem itself. It is acknowledged that around 20% of global CO₂ emissions are caused by burning tree – usually allocated to tropical forests. But regarding the enhanced greenhouse effect, it makes no sense to distinguish this CO₂ from that emitted by chimneys in temperate climate zones from many small dispersed appliances or from more concentrated wood burning facilities producing electricity and/or heat.

The said 'effective emission factor' of zero for wood combustion can, thus, only be the result of a nullifying hypothesis which has been criticised as part of “**The Carbon Neutral Myth**”, when tree planting projects were offered by offset companies as a means to compensate for personal carbon debt:

“The reason why the offset companies can argue for carbon neutrality is they are using a carbon calculation method that is best termed 'future value accounting'. Carbon savings expected to be made in the future are counted as savings made in the present... Each time someone offsets their emissions, the amount of CO₂ emitted is automatically in the atmosphere, whereas the period of 'neutralisation' takes place over a much-longer time period, sometimes 100 years” (Smith 2007, 24).

In the following, this idea is substantiated by talking about the ecological debt of CO₂-emissions (inclusive equivalent emissions of other greenhouse gases, for simplicity altogether called CO₂) as analogous to financial debt; and the repayment of this debt through future photosynthetic activity in form of forest growth, called CO₂ dividends. By this way, we dissolve the zero emission claim analytically into its constituent processes and make better accountancy possible.

3. CO₂ DEBT FROM WOOD COMBUSTION AND ITS EVENTUAL REPAYMENT BY CARBON DIVIDENDS

Against the promise of the British Carbon Neutral Company (former: Future Forests) to “ensure that woodlands (to be invested in, red) are created and well-managed over a minimum of 99 years”

Smith argues: *“The fact that the trees are supposed to absorb the carbon over a period of 99 years*

also raises a serious issue over timing. Many climate scientists have emphasised that the next decade is a critical period for emissions reductions, if we are to avoid crossing a threshold of global temperature increase that would create feedback loops amplifying the impact of climate change.” (Smith 2007, 22). This is only one, but politically the most dramatical aspect of the time problem dealing with irreversible, historical time. I will come back to this issue.

Another aspect of the time issue in the sense of reversible (or: ergodic) time is at stake, when evaluating at project level, whether or rather: when the break-even point for carbon neutrality is reached during the working period of a harvested-wood-to-energy-project, based upon the substitution of wood for fossil fuels in different types of combustion systems. Such a differentiated approach has been modelled by the Center for Conservation Sciences at Manomet/Massachusetts (Manomet 2010) for the Dept. of Energy Resources (DOER) of the Commonwealth of Massachusetts. Upon receipt of the report “Biomass sustainability and carbon policy study” the state's Secretary of Energy and Environmental Affairs Ian Bowles said in an enabling letter of July, 7 to DOER Commissioner Philip Giudice now to ***“have a deeper understanding that the greenhouse gas impacts of biomass energy are far more complicated than the conventional view that electricity from power plants using biomass harvested from New England natural forests is carbon neutral”***. Despite remaining uncertainties, Bowles was “confident that we now have enough information for DOER to take the next step in changing the way in which the Commonwealth provides incentives for biomass energy.” (Bowles 2010) He also was “thankful to the Manomet researcheres as well as the many scientists, stakeholders and concerned citizens who have helped us to clarify the complex issues surrounding biomass power and greenhouse gas emissions”.

The authors of the Manomet/NCI report themselves claim that the “framework and approach we have developed for assessing the impacts of wood biomass energy have wide applicability for other regions and countries” (Manomet 2010, 6). It is, therefore, worth wile to discuss both the formal framework and some of the assumptions made in the substantial approach of the study, which are reflected in its conclusions. Another, critical source has started the discussion of the science behind the Manomet biomass report and the validity of its main conclusions concerning net carbon emissions from biomass energy, relative to fossil fuels (Booth 2010). I draw upon this critique, because it proceeds in an immanent way based upon the premises of the Manomet study. Own extensions are made from this point of departure. To start with, I will, however, shortly recapitulate basic science informations on the relative amount of CO₂ released extra, when biomass fuels, especially: wood, are substituted for fossil fuels. These are minimum amounts of the real carbon

debt incurred by such substitution, being generically caused by the fuel switch as such – and not other, more complicated factors of technology.

Table 1. CO₂ emissions pr. unit of energy produced from combustion of three fossil fuels and from wood - absolute and percentage change when switching fuel source

FUEL from	natural gas	gas oil	coal	wood	
	57	74	95	102	[kg CO ₂ absolute per GJ]
to					
nat. Gas		-23	-40	-44	%-change
gas oil	30		-22	-27	with
coal	67	28		-7	switch of
wood	79	38	7		fuel

Source: J.Fenhann, N.A. Kilde 1994: Inventory of emissions from Danish sources, 1972-1992

The Manomet report recalls this fact in its Executive Summary simply by stating: “Forest biomass generally emits more greenhouse gases than fossil fuels per unit of energy produced. We define these excess emissions as the **biomass carbon debt**.” (Manomet 2010, 6). The main text contains, however, no quantitative data on how big the difference is, depending upon which fossil fuel is substituted. The term 'more greenhouse gases' could even be misunderstood as meaning qualitatively different types of these gases. At any rate, the basic science is omitted, although it is said: “The initial level of carbon debt is an important determinant of the desirability of producing energy from forest biomass.”(loc.cit.)- At a more complex level of project evaluation, the study states: “The atmospheric greenhouse gas implications of burning forest biomass for energy vary depending upon the **characteristics of the bioenergy combustion technology, the fossil fuel technology it replaces and the biophysical and forest management characteristics of the forests from which the biomass is harvested.**”

In this paper, I will not deal with the combustion technologies applied, because it is questionable, whether efficiency assessments based upon 1.law efficiency are meaningful, when comparing heating plants with combined heat and power production. Regarding forests, their regeneration and continued exploitability is often taken for granted – as a gift of nature, perhaps supported by certification. In the Manomet study it is spelled out as a mere potential reduction factor to be weighed against the carbon debt which inevitably occurs when shifting fuel. Regrowth of the harvested forest, it says, “removes this carbon from the atmosphere, reducing the carbon debt. After the point at which the debt is paid off, biomass begins to **yield carbon dividends in the form of atmospheric greenhouse gas levels that are lower than would have occurred** from the use of fossil fuels to produce the same amount of energy.” Pointing at the figure below, a global hint is added:

“The full recovery of the biomass carbon debt and the magnitude of the carbon dividend benefits also depend on future forest management actions (or inaction, red) and *natural disturbance events* allowing that recovery to occur” (loc.cit.). Natural disturbance is not seen as a long term problem, e.g. in climate connection with unsustainable levels of global warming, but only in terms of a history of weather 'events'. This must be seen in the light of the policy targets, which Massachussetts has set itself (together with other North-Eastern States), namely to reduce greenhouse gas emissions by 10-25% in 2020 and by 80% in 2050. So, a span of at least 40 years has to be reckoned with, and here, the still rising curve of global GHG emissions has direct implications for forest development, making the question of a turning point very decisive, see below.

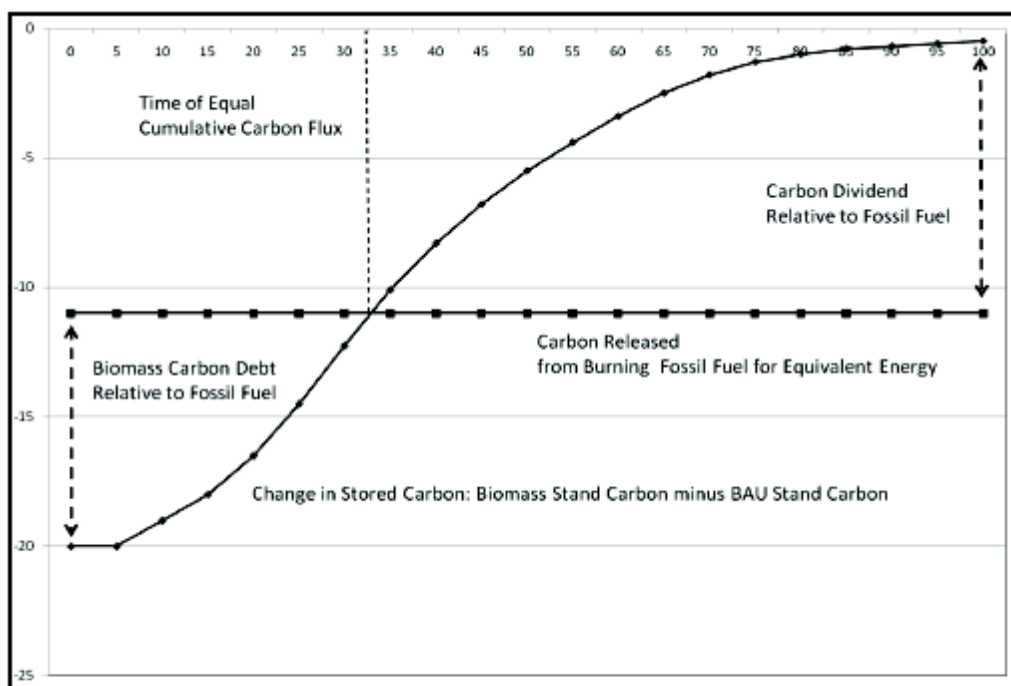


Figure 1 (tonnes of carbon). The schematic above represents the incremental carbon storage over time of a stand harvested for biomass energy wood relative to a typically harvested stand (BAU). The initial *carbon debt* (9 tonnes) is shown as the difference between the total carbon harvested for biomass (20 tonnes) and the carbon released by fossil fuel burning (11 tonnes) that produces an equivalent amount of energy. The *carbon dividend* is defined in the graph as the portion of the fossil fuel emissions (11 tonnes) that are offset by forest growth at a particular point in time. In the example, after the 9 tonnes biomass carbon debt is recovered by forest growth (year 32), atmospheric GHG levels fall below what they would have been had an equivalent amount of energy been generated from fossil fuels. This is the point at which the benefits of burning biomass begin to accrue, rising over time as the forest sequesters greater amounts of carbon relative to the typical harvest.

Fig. 1 (tonnes of carbon) Schematic view upon initial *carbon debt* and its repayment in the form of *carbon dividends* over a century; from: Manomet 2010, Exec.Summary, p.6. Note: upper horizontal axis = Year after cutting (break even at year 32)

As Booth 2010 makes explicit, this figure shows the biomass carbon debt relative to (constant) carbon emissions from fossil fuel use – yet only for forest cutting from a single year. The carbon dividend shown is provided “only for a single year's worth of cutting on a particular harvested area” (a single acre of land). This does not describe the integrated picture of carbon emissions from a biomass facility, “*which operates continuously over many years and requires new forest to be cut every year. The integrated picture is more complex and can be drawn as a series of supplementary curves, one for each year of cutting.*” See fig.2.

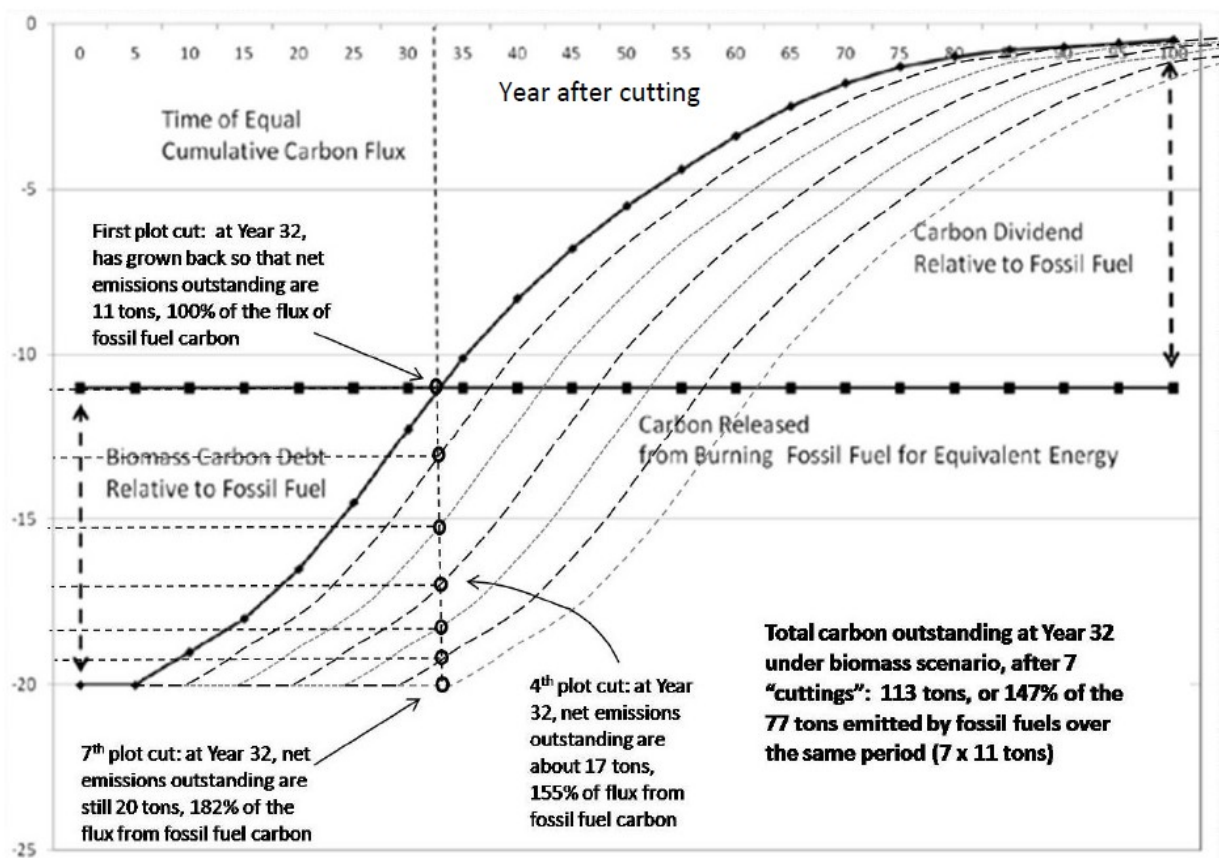


Figure 3. Integrated carbon emissions for a hypothetical biomass facility, assessed over a number of years. Whereas the first plot cut has regrown and achieved parity with fossil fuel emissions by Year 32, this is not the case for all subsequent plots cut, which still have carbon debts outstanding. Emissions from an actual facility, as assessed in this integrated picture, are considerably higher than for the single plot analysis presented above. At Year 32, net emissions from biomass in this hypothetical example are still 147% of those from fossil fuels.

Fig. 2. *Extended version* of the Manomet study plot for carbon recovery *with successively more*

acres of forest area exploited for continuous biomass combustion operations. (stipled curves in 5 year intervals). Source: Booth 2010, p.9

As written in the figure text, total carbon outstanding at year 32 after 7 'cuttings' is still negative at nearly 150% of emissions from fossil fuels producing the same amount of energy. No comparable calculations or even a hint at the result - postponing the break even point between biomass and fossil fuel emissions - are given in the Manomet study. Some short supplementary remarks are, as Booth argues, not sufficient to compensate for a tendency in the study to make results look more favourable for biomass projects than is warranted by the otherwise more complex logic of the model construction.

A crucial assumption in model construction, which Booth 2010 does not challenge, is, however, contained in the forest growth model itself. The Manomet study presupposes that a heavier removal on an area cut for biomass, compared to the same area only being cut for timber, increases the growth rate in the recovering forest, so that the difference in total stand carbon in the course of a century is reduced to zero or even turned into an increase. See fig. 3.

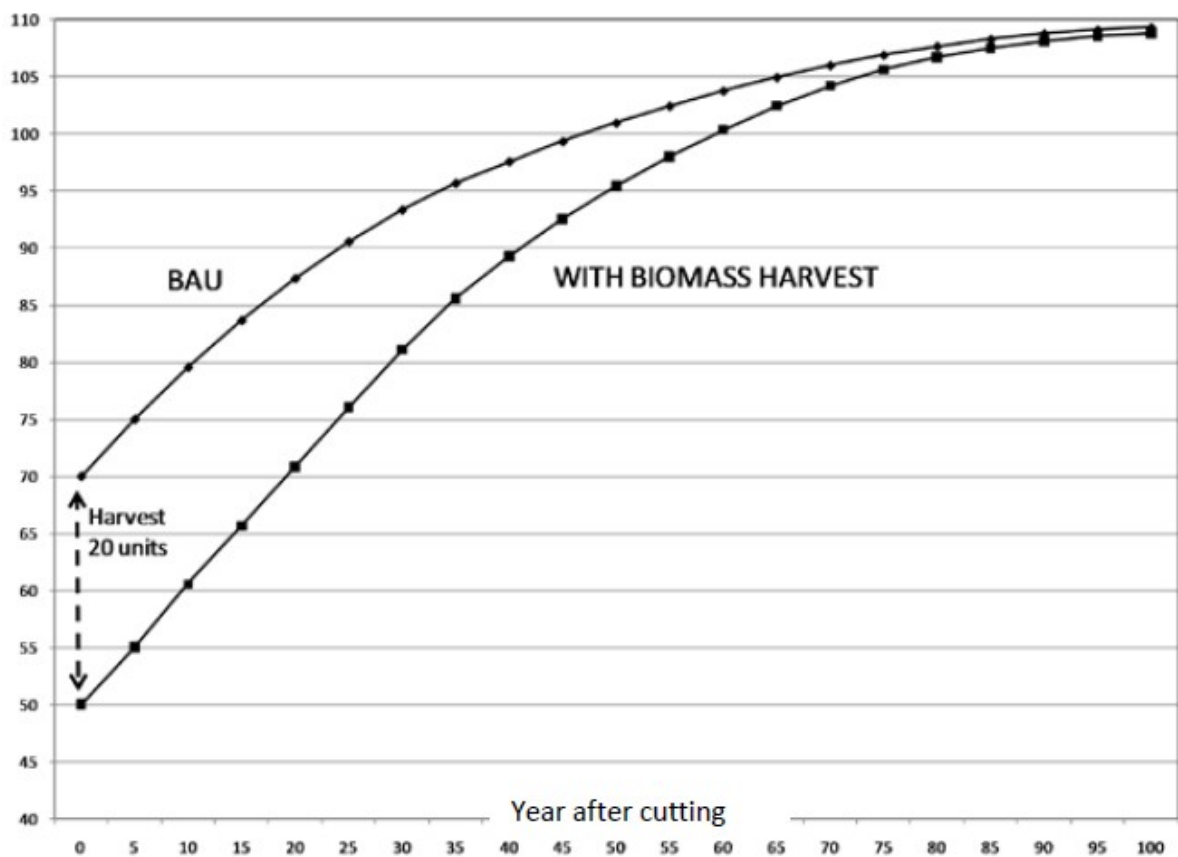


Figure 1. Forest growth following harvest in the “business-as-usual” timber harvesting scenario, and the scenario which harvests for both timber and biomass. This graph is labeled 6-2a in the Manomet report.

Fig.3. Total stand carbon (vertical axis) **and carbon recovery times** (tonnes carbon)

The validity of this model assumption will depend upon site-specific factors, partly of biophysical nature in the ecosystem concerned, partly the forest management strategies chosen. The model presupposes that the acre is not re-cut before full carbon recovery. This is one of the assumptions Booth criticises as lacking realism – not the least because this non-intervention is difficult to control.

Methodologically, the Manomet study has reframed and broadened the CO₂-neutrality question in 'incremental terms' (Manomet 2010, 99):

Framing the problem this way shifts the focus away from total emissions, allowing the net carbon flux problem to be viewed in purely incremental terms. *In our forest carbon accounting approach, the question then becomes how rapidly must the forest carbon sequestration rate increase after a biomass harvest in order to pay back the biomass carbon debt and how large are the carbon dividends that accumulate after the debt is recovered?* The debt must be paid off before atmospheric GHG levels fall below what they would have been under a fossil fuel scenario. After that point, biomass energy is yielding net GHG benefits relative to the fossil fuel scenario.

A limit of this incrementalist approach can be seen, however, in the cited assumption that a heavier removal on an area cut for biomass, compared to the same area only being cut for timber, continuously increases the growth rate in the recovering forest. This linear trend must meet its asymptote, because foresters have not yet learned the art of making trees grow into heaven. On the contrary, Schlamadinger et al. 1999 have pointed at a limit in *carbon density of a forest* which when transgressed makes any hope ever to recover the carbon debt incurred by the initial cut unrealistic, especially when realising that future benefits because of their inherent insecurity have to be discounted appropriately. Applying a **4% discount rate**, which emphasizes the short term GHG debt, the limit in stand density becomes crucial: “There is *no gain at all* in terms of net present value of C *to harvest forests with an initial C storage greater than about 150 MgC ha⁻¹.*” (Schlamadinger et al. 1999, 323). This is said here only to make the argument that there is an absolute limit.

The necessity of prioritising short term versus long term effects is made clear in the Manomet study, but is not explored e.g. by applying different discount rates. A short remark is stating the obvious: “The higher the discount rate – indicative of a greater preference for lower GHG levels in the near term, the longer the time to reach the point of fully-offset damages.” (Manomet 2010, 99) The

trade-off between near term damages and long term benefits is turned over to the politicians to decide upon, but the study itself does not give an unbiased picture of, how the cross-over from short term damage to long term benefit can be expected to occur in reality – how long periods of indifference may be. It rather suggests, that what might be a longer period of transition with ambivalent results, in fact would be a single point in time.

A series of further assumptions has been highlighted by the critique of Booth 2010 as giving an illusionary picture that the break-even point is nearer than it might be in reality, see App.1.

As combined effect of these assumptions Booth resumes (2010, 4):

To the extent that these assumptions are not warranted, the Manomet study has underestimated the net carbon emissions of biomass power, and policy-makers should be extremely cautious about accepting the study's optimistic conclusions concerning the point in time when biomass can start providing a carbon dividend.

In 1999, Schlamadinger and Marland proposed another consequence at a more direct level than state regulation, namely to place the burden of proof on the side of project makers: ***“Any intent to use forest harvesting to help mitigate the build-up of carbon dioxide in the earth's atmosphere will have to demonstrate that the forest regrowth and product use can compensate for any loss from the forest stand as a result of the initial harvest.”*** (Schlamadinger and Marland 1999, 324)

This turns the burden of proof from the side of scientists and citizen groups, who in North America have begun to intervene in the political process (see e.g. Sheehan and Schlossberg 2010, editors of 'Biomass Busters' news). The ratification of the Kyoto Protocol and national/regional implementations of its rules on land use, land use change and forestry have in countries that have ratified it led to general clauses of calculating CO₂ emissions from all kinds of biomass as virtually non-existent (Johnson 2008), e.g. in the Danish Law on CO₂ quotas from 2004, as amended in 2008. It is an irony of world-history that the ***non-ratifying countries*** might be quicker to recognise and perhaps ***correct the fatal flaw of carbon accounting*** with unconditional zero emissions for all biomass combustion.

4. POLITICALLY PROMULGATED CO₂ ACCOUNTING ERRORS AND PROPOSALS TO FIX THEM

Before the Copenhagen Climate Summit (COP 15) Searchinger et al. published an article in Science, where they in relation to EU cap and trade rules and the climate bill passed by the U.S. House of Representatives in early 2009 argued that emissions from the use of bioenergy have to be

accounted for – either at the *output* side as emissions from smokestacks and tailpipes or at the *input* side into the technosphere, when land-use is changed by clear-cutting forest areas:

However, exempting emissions from bioenergy use is improper for greenhouse gas regulations if land-use emissions are not included. The Kyoto Protocol caps the energy emissions of developed countries. But the protocol applies no limits to land use or any other emissions from developing countries, and special crediting rules for “forest management” allow developed countries to cancel out their own land-use emissions as well (1, 10). Thus, maintaining the exemption for CO₂ emitted by bioenergy use under the protocol (11) wrongly treats bioenergy from all biomass sources as carbon neutral, even if the source involves clearing forests for electricity in Europe or converting them to biodiesel crops in Asia .

This accounting error has carried over into the European Union’s cap-and-trade law and the climate bill passed by the U.S. House of Representatives (1, 12, 13). Both regulate emissions from energy but not land use and then erroneously exempt CO₂ emitted from bioenergy use. In theory, the accounting system would work if caps covered all land-use emissions and sinks. However, this approach is both technically and politically challenging as it is extremely hard to measure all land-use emissions or to distinguish human and natural causes of many emissions (e.g., fires).

Source: Searchinger et al. 2009

In the same vein, Johnson 2009 pointed at the painful, but necessary learning process, whereby accounting and standards for liquid biofuels were changed from automatically presupposing carbon-neutrality to accounting for land-use change, i.e. deforestation. ”But it is partially or completely missing from standards for footprinting and LCA (life cycle analysis, red) of solid fuels”. (Johnson 2009, 165) He also gives an overview regarding international institutions which have adopted the easy way of calling the combustion of all kinds of biomass for CO₂-neutral, although e.g. the

classical text of Bent Sørensen on 'Renewable Energy' (2nd ed. 2000, p. 477, italics rcd) clearly stated: “Concerning carbon dioxide, which accumulates in the atmosphere as a consequence of rapid combustion of fossil fuels, it should be kept in mind that the carbon dioxide emissions during biomass combustion are balanced in magnitude by the net carbon dioxide assimilation in the plants, so that the atmospheric CO₂ content is not affected, at least by the use of biomass crops in fast rotation” as e.g. yearly energy plants. **“However”**, as Sørensen underlines, **“the time lag for trees may be decades or centuries, and in such case the temporary carbon dioxide imbalance (between CO₂-emission by actual combustion and the eventual binding of the same amount of CO₂ by additional photosynthetic activity, rcd) may contribute to climatic alterations.”**

Before the Manomet report was issued (June 2010), some of the members of the Searchinger group actually wrote a letter to Congress in order to stop the menacing fixation into law, what already has been adopted as such in Europe:

Dear Speaker Pelosi and Majority Leader Senator Reid,

We write to bring to your attention the importance of accurately accounting for carbon dioxide emissions from bioenergy in any law or regulation designed to reduce greenhouse gas emissions from energy use. Proper accounting can enable bioenergy to contribute to greenhouse gas reductions; improper accounting can lead to increases in greenhouse gas emissions both domestically and internationally.

Replacement of fossil fuels with bioenergy does not directly stop carbon dioxide emissions from tailpipes or smokestacks. Although fossil fuel emissions are reduced or eliminated, the combustion of biomass replaces fossil emissions with its own emissions (which may even be higher per unit of energy because of the lower energy to carbon ratio of biomass). Bioenergy can reduce atmospheric carbon dioxide if land and plants are managed to take up additional carbon dioxide beyond what they would absorb without bioenergy. Alternatively, bioenergy can use some vegetative residues that would otherwise decompose and release carbon to the atmosphere rapidly. Whether land and plants sequester additional carbon to offset emissions from burning the biomass depends on changes both in the rates of plant growth and in the carbon storage in plants and soils. For example, planting fast-growing energy crops on otherwise unproductive land leads to additional carbon absorption by plants that offsets emissions from their use for energy without displacing carbon storage in plants and soils. On the other hand, clearing or cutting forests for energy, either to burn trees directly in power plants or to replace forests with bioenergy crops, has the net effect of releasing otherwise sequestered carbon into the atmosphere, just like the extraction and burning of fossil fuels. That creates a carbon debt, may reduce ongoing carbon uptake by the forest, and as a result may increase net greenhouse gas emissions for an extended time period and thereby undercut greenhouse gas reductions needed over the next several decades¹.

Source: William H.Schlesinger (U.S. Academy of Sciences), Letter to Congress, May, 17 2010, subscribed by 90 scientists.

5. FORESTS AS TIPPING POINTS UNDER MODERATE GLOBAL WARMING

There are good reasons, why forest normalcy is a goal worth of protecting (social multifunctionality, livelihood, maintenance of the infrastructure of infrastructures, Daly). As IPCC research under the lead author Andreas Fischlin (Fischlin et al. 2007) has demonstrated, forests will, however, with high probability already under moderate global warming (from 2,5 degrees C above pre-industrial level upwards) globally change from a function of being net CO₂ sinks to that of net CO₂ sources. After the fatal failure of COP15 at Copenhagen this degree of global warming is expected to occur as a lower estimate, if more radical changes as those proposed by the March 2010 peoples' climate summit at Cochabamba/Bolivia (www.cmpcc.org) - and by KlimaForum 09 in Copenhagen under the slogan 'System change, not climate change' - don't materialise.

The threat of forests turning into sources of additional CO₂ to the atmosphere was in early 2009 made public by the International Union of Forest Research Organisations (Buck et al.2009). It was also discussed within the COP 15 side event "Forest Day 3". Here, a representative of the European wood industry declared that all this stuff only was theory. He knew that EU regulations as a follow-up of the Marrakesh Accords of 2001 on operationalising the Kytoto Protocol on Land Use, Land Use Change and Forestry did not make any discrimination between plant matter grown in short rotation as e.g. straw and plant matter growing over many years, decades or even centuries as stem tree, see the above quotation from 'Renewable Energy' by physicist Bent Sørensen, where he warned against possible impacts of a time-lag upon global warming. As Sørensen recently spelled out in a short debate with the Searchinger group in Science, the practically decisive question is now to **avoid combustion** to protect the global carbon balance: *"What matters is, what is done with the wood from clearing. If combusted, this is a one-time, negative impact on the carbon balance. If the wood is used for house construction or furniture, the immediate impact is zero. There will be a negative impact only, if these items are later burnt."* (Sørensen 2010) And: Bigger positive effects in replacing fossil fuels are possible, when wood is re-substituted for materials, which the petrochemical industry and its up-stream linkages within the last 50-60 years have substituted for wood (Commoner 1990).

When everything is collapsed under the misleading title of 'biomass', the forest industry has, however, not only Kyoto-governments to set its faith into, but up till now also mighty financial institutions. They have long since accepted to give insurance for investments into conversions e.g. of big power plants from coal or even natural gas to biomass e.g. in the form of wood chips – whether the logo 'CO₂-neutral' is added or not.

6. CREDITWORTHINESS IN QUESTION

The trustworthiness of financial institutions has in these years been questioned because of the emission of false credits and their derivatives with alleged security in real estate related income streams. The rosy, even harmonious picture of power industry changing from dirty coal to green fuel as wood chips may, however, become less rosy and eventually lead to the same awakening, because it is funded on bad science - not intentionally bad, but bad in its lack of realism to explain and govern the complexity of real world developments. At the macro ecological level, the fate of forests is as insecure as the fate of the American middle class in its human-ecological niche of suburbia, when peak oil is making itself felt (Heinberg 2005). The history of oil is one common root cause of this coincidence: More energy put into and staying in the atmosphere means higher probabilities of forest fire, more mobilisation of the C pool in soils (Karhu et al. 2010), more destabilisation of forest habitat for endogenous species (Kurz et al. 2008), forest destruction by invading species etc.

So, it is at least equally, but probably more insecure to calculate with an expanded and sustained net CO₂-assimilation power of the world's forests as it was at the roots of the last big financial crisis to calculate with real estate rents based upon dwindling personal income streams. Both ways of calculations have the assumption in common, that – non-human or human – living potentials – which can produce living matter with an increment of CO₂-binding or commodities with a surplus value to be realised on capitalist markets – might be used indefinitely for the sake of surplus production – irrespective of comprehensive reproduction requirements at local and/or personal scale. The latter emerge in the form of limits to trends of commodity production in the sense of Wallerstein's asymptotes (Wallerstein 1991).

Discussing commodification versus decommodification in relation to carbon trading and carbon offsets Larry Lohmann has drawn the following parallel: "Just as financial-sector quantism lost touch with the on-the-ground realities of mortgage holders in low-income neighbourhoods of US cities, *so carbon-sector quantism distances itself from the social or biophysical realities of specific carbon offset projects.*" (Lohmann 2010, 245) It may be said that the term 'CO₂-neutrality' by introducing zero emissions for all biomass is only a short-hand term deducible from this 'quantism'. In order to open it up for discussion based upon both local and technical knowledge on ecosphere and technosphere interactions, including human health, the Manomet study approach has a useful form. Regarding the content of its many parameters, the critique raised by Booth 2010 has to be followed up in order to make the complexity of the issue better understandable and to ground

it on local/regional realities.

A strategy of de-commodification has, at any rate, to restrict the trend that the dynamics of financial markets spill over into projects of substituting fossil fuels. As testified by Friends of the Earth in the U.S. legislative process on carbon trading: “***‘Subprime carbon’*** -- called 'junk carbon' by traders -- ***are contracts to deliver carbon that carry a higher risk of not being fulfilled, and thus may collapse in value.*** They are comparable to subprime loans or junk bonds, debts that carry a higher probability of not being paid. ***Carbon offset credits (credits derived from projects designed to reduce greenhouse gases) can carry particularly high risks because many things can go wrong with offset projects. Not only do such projects face normal commercial and operational risks, but independent verifiers may find that a project has not reduced the projected amount of emissions, for example; or an agency issuing credits (e.g. United Nations) may determine that a project failed to comply with relevant standards.*** Subprime carbon particularly can become a problem because sellers can make promises ahead of time to deliver carbon credits before the credits are issued, or sometimes even before greenhouse gas emissions have been verified.” (Friends of the Earth 2009, see also Chan 2009).

CONCLUSION

In the above discussion of a regionalized context of ***project evaluation*** as presented by the example of Manomet/Massachusetts, the ***burden of proof*** will have to rest upon project proponents showing that it is achievable in reasonable time scales to offset the same project's carbon debt. Public information must document this in a transparent manner, before official approval is given. It is increasingly urgent to apply a ***discount factor*** on future carbon dividends that are too insecure, as originally shown by Schlamadinger and Marland 1999. This is so, because the future carbon reduction capacity of global forests is at odds. Such calculations should be made public for any projects where the present value of a carbon debt is offset by carbon dividends from living matter that only accrue after more than a few years. As the European Presidency of the Brussels European Council (8/9 March 2007) underlined in its conclusions: ”30. The European Council reaffirms that ***absolute emission reduction*** commitments are the backbone of a global carbon market.”(Council 2007) If this commitment is to be realised regionally, absolute emission reductions should count as the backbone of any single project. Project planning should be scrutinised accordingly. The ***European Investment Bank and/or Fund*** should be made responsible to do this in transparent ways. - It is possible to find paths of a more regular and solidaric 'green' investment strategy than markets alone can secure. But this is surely not done by governments throwing money after the banks, pressing austerity policies on the heads of people and in case of doubt reducing investments

in ecologically appropriate technologies as e.g. enhanced wind power (Skouboe 2010). They will rather continue to combine disrespect regarding institutional credit policy potentials at European level with populist credits for such morally dubious techniques as local wood stoves in densely built-up areas.

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App. I. PROBLEMATIC ASSUMPTIONS IN THE MANOMET REPORT (Booth 2010)

1. Large trees are used for biomass fuel.

Because forest regrowth rates in the model are to a large extent a function of the intensity of harvest (with heavier harvests of larger, older trees opening up more space for regrowth to occur), the model achieves maximal regrowth and resequstration of carbon released by biomass burning by assuming that relatively large, old trees are logged for biomass. However, this is not representative of actual biomass harvesting, which is more likely to remove low-diameter, low-value material. Actual regrowth rates of forests where low-diameter material is removed will be much slower than modeled.

2. Harvested forest stands must not be recut pending carbon sequestration.

The model additionally requires that once a stand has been cut, it must not be re-cut until it has achieved a large proportion of the amount of standing carbon in an unmanaged stand. The Manomet report itself acknowledges this is unlikely.

3. A high percentage of tops and limbs are used as fuel.

Because the tops and limbs of trees harvested for timber under the BAU scenario are assumed to stay in the forest and rot, producing carbon, the model assumes almost no carbon penalty for collecting this material and burning it. The model assumes that 65% of all tops and limbs generated on acres harvested for biomass can be removed from the forest for use as fuel, supplying a relatively large “low carbon” source of fuel in the model. Removal of this amount of tops and limbs appears to be necessary to achieving the transition from biomass carbon debt to carbon dividend in the model, but is not compatible with maintaining soil fertility and other forest ecological functions.

4. Biomass harvesting only occurs on land that is already being harvested for timber.

The study takes as its BAU assumption that when land is harvested for timber, all residues are left in the forest, whereas a portion is collected for fuel in the biomass scenario. The study draws no conclusions concerning carbon dynamics and regrowth in forests cut solely for biomass. This assumption is necessary for generating the “low carbon” fuel source of tops and limbs from commercial timber

harvesting that is integral to calculating carbon dividends from biomass in a timely way. Land cut solely for biomass would take a much longer time to achieve a carbon dividend.

5. Soil carbon emissions are negligible.

The soil carbon pool is extremely large, and a significant fraction of it is easily decomposed and evolved as CO₂ when soils are disturbed by logging. However, the Manomet model completely disregards this source of emissions that are associated with biomass harvesting. This assumption is challenged by the author of a major review on soil carbon emissions cited, and dismissed, by the Manomet study.

6. Firewood harvesting is not impacted.

Although indirect land use effects can be major sources of greenhouse gas emissions from biomass harvest, and although the RFP for the Manomet study requested that the study evaluate indirect land use effects, the study does not acknowledge that displacement of firewood harvest by biomass harvest could result in “leakage” of firewood harvesting and more forestland being cut for firewood.

7. Wood pellet manufacture incurs no more carbon debt than green chips.

Although it is well-established that manufacture of wood pellets requires significant inputs of green wood in excess of the heating value actually embodied in the pellets produced, as well as significant fossil fuel expenditures, the study treats wood pellets as embodying the same amount of carbon and energy as green wood chips.

8. Wood from landclearing incurs little carbon debt.

The study concludes that woody biomass from non-forestry sources, such as from land-clearing, will not entail any greater greenhouse gas emissions than forestry wood. However, no modeling is conducted to substantiate this conclusion. The study also does not discuss how wood from land-clearing can be considered eligible under requirements that biomass fuels be available on a renewable and recurring basis, as required under the Regional Greenhouse Gas Initiative.