Tax on the use of peat for energy in Finland[i]

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Brief summary of the case

Peat plays a significant – and controversial - role in Finland's energy mix. The negative impacts on climate, biodiversity and water associated with the extraction and use of peat have been widely recognised. However, the considerations linked to national energy security and employment, together with interlinks with the forestry sector, have resulted in a continued special arrangement for peat in the context of the energy tax regime. The tax on peat in Finland is decided based on political considerations, without taking into consideration peat's energy content and level of CO_2 emissions. As a part of a political initiative to address environmentally harmful subsidies, a decision was taken to increase the peat tax rate from EUR 1.9/MWh in 2012 to EUR 4.9/MWh in 2013 with a further increase to EUR 5.9/MWh foreseen in 2015. However, a political decision was later made to revoke this increase in 2016. While the attempts to reform the Finnish peat tax - to internalise the environmental impacts of peat extraction and use - have been unsuccessful so far, the lessons learned highlight the possible complexities related to environmental tax reform, including barriers created by the interplay with other sectoral policies.

1 Description of the design, scope and effectiveness of the instrument

1.1 Design of the instrument

Peat plays a significant role in Finland's energy mix (IEA 2013). Since 1994 the use of peat for energy purposes (heat) is taxed as a part of the national taxation framework for energy sources. The tax is set by the Government (Ministry of Finance) in cooperation with the parliament and is paid by end-users, targeting the users whose consumption of peat for heat production exceeds 5,000 MWh / year (Finnish Customs 2016). The use of peat – as well as any other energy sources - for electricity is not taxed.

In general, the taxation of different energy sources in Finland is determined by their energy content and the level of CO_2 emissions (e.g. as per the EU Energy Tax Directive 2003/96/EC). However, the use of peat for energy purposes in Finland has always been a political issue influenced predominantly by the questions of national energy security (e.g. limiting the dependency on coal exports) and employment. Consequently, peat enjoys special treatment under the national framework and its tax level is determined by political factors, excluding any direct connection to CO_2 emissions (Leinonen 2010) (see section 1.2 below).

While Finland was the first country in the world to introduce a CO_2 tax in 1990, peat was initially exempted on the grounds of being considered a sustainable energy source[1] (Skou Andersen et al. 2001). Peat became part of the energy and emission tax framework only four years later, however due to energy security and employment related considerations the

[1] Since 2006, the UN Climate Convention considers peat as an energy source comparable to fossil fuels (http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf); Finland classifies peat as a "slowly renewing biomass fuel"

imposed tax was deliberately kept low, starting at EUR 0.35/MWh during the 1990s and increasing to EUR 1.59/MWh during the 2000s (Statistics Finland 2016). Consequently, the use of peat for energy purposes has effectively been subject to Government subsidy ranging from EUR 109-129 million per year (Table 1.1).

As part of a political initiative to address environmentally harmful subsidies (Fin Government 2012), a decision was taken to increase the tax rate from EUR 1.9/MWh in 2012 to EUR 4.9/MWh in 2013 with a further increase to EUR 5.9/MWh foreseen in 2015 (IEA 2013). This decision still did not bring peat in line with the overall energy tax regime, i.e. it was based on a political decision rather than the consideration of peat's energy content and emissions, and a political decision was made to revoke this tax increase in 2016 with the tax returning back to EUR 1.9/MWh (see section 1.2 below).

Were peat to be tax similarly to other energy sources, its tax should be around EUR 19-20/MWh for heat production and EUR 13-14/MWh for combined heat and electricity production[2] (Finnish Government 2014).

Table 1.1 Development of total annual peat subsidy in 2009 – 2012

Year	Subsidy (million EUR)
2009	109
2010	109
2011	128
2012	129

Source: Rauhanen 2011, in Hyyrynen 2013

1.2 Drivers and barriers of the instrument

Considerations related to national energy security, regional employment and profitability of the forest sector form key barriers for reforming the peat tax in Finland, and are reasons for reversing the reform of the tax rate in 2016.

Despite its carbon intensity (see section 1.4), the domestic availability of peat means it is considered an integral element in securing the national energy supply (IEA 2013). It has been estimated that the area currently suitable for peat production[3] is around 0.6 million hectares (Virtanen 2015). Peat represented around 6% of total energy consumption in Finland in 2011 and 4% in 2016 (IEA 2013; Aho 2016). Average annual production in the past decade has been around 7.3 Mt per year with annual fluctuations from 3.7 Mt to 13 Mt (IEA 2013). The aim of the peat tax regime is to ensure that peat, together with wood biomass, maintain their competitive advantage in comparison to non-domestic fossil fuels, in particular coal (see below). Consequently, while the tax on peat has been kept low over the years, the tax for coal – reflecting its energy content and CO_2 emissions - has increased steadily from EUR 3/tonne

[2] CO_2 tax is halved for the combined production of heat and electricity to avoid double counting.

[3] Comprises of areas that a) are already in used for peat production or b) areas where peat production would be technically possible and allowed (i.e. peatlands previously drained for agriculture and forestry purposes and not under conservation).

at the start of the 1990s to EUR 49/tonne at the end of 2000s and reaching EUR 177/tonne in 2016 (Finnish Statistics Centre 2016).

Peat harvesting also provides employment in rural areas in Finland hence its continued use is supported by a range of stakeholders (see section 1.4).

In practical terms, technical aspects linked to the functioning of biomass boilers are one of the commonly cited barriers for reducing the use of peat in energy production (IEA 2013, Hyyrynen 2013). Peat is commonly co-fired with wood biomass to increase the overall energy output, reduce corrosion in the boilers and lower the levels of small particulate matter emissions (Vesala et al. 2010, EIA 2013, Hyyrynen 2013). While technologies are available to reduce corrosion (Mudgal et al. 2014; Karlsson et al. 2015)[4], it is considered that high levels of investment in more modern boilers would be needed to allow the use of wood-based biomass only (Pöyry 2012).

An interlinkage between the price, and consequent use, of wood biomass and taxation of peat is commonly cited as one of the key reasons for maintaining a low peat tax rate (e.g. Finnish Government 2014, Hyyrynen 2013, Aho 2016). In Finland, the production of wood biomass for energy (electricity) purposes is subsidised from the national budget. The purpose of this subsidy is to promote the uptake of renewable energy and support the role of the national forestry sector in the provisioning of such energy. The legislation[5] underpinning these subsidy payments links them to the price and tax of peat so that an increase in peat tax increases the competitiveness of wood-based biomass against peat, including reducing the need to subsidise wood biomass (Finnish Government 2014)[6]. While this connection makes sense from the perspective of steering the use of domestic energy sources (i.e. allows for peat to be replaced by wood-based biomass), it also works in reverse, making lowering the tax on peat a prerequisite for increasing the level of wood biomass subsidy and in this way controlling the price of wood.

In general, the price of wood biomass affects its competitiveness against coal in national energy markets. The political thinking underpinning the revoking of the 2013 peat tax increase was to ensure the competitiveness of national biomass-based energy sources (i.e. the combined use of wood and peat) in the light of ongoing reductions in the price of coal. Since peat is an integral component in the current biomass-based energy production in Finland, reducing the tax level back to EUR 1.9/MWh was considered necessary to support the continued use of domestic sources of biomass in energy production.

The national Energy and Climate Strategy (ECS) for 2030 reinforces the role of peat as part of the energy mix for Finland, stating that the taxation for peat should be used to retain the competitive advantage of peat in comparison to coal while ensuring not creating such an advantage in comparison to wood-based biomass (TEM 2016). In parallel, the strategy also commits Finland to phase out coal by 2030 (TEM 2016c). Given the complex technical and political interlinkages between wood biomass (i.e. the main candidate for replacing coal) and

[4] Addition of digested sewage sludge or sulphur / sulphur containing compounds to the wood fuel has been used elsewhere (e.g. Sweden) to decreases in corrosion rate in incinerators and biofuel-fired boilers.
[5] Law 1396/2010 on renewable energy source in Finland: http://www.finlex.fi/fi/laki/alkup/2010/20101396
[6] https://www.eduskunta.fi/FI/vaski/HallituksenEsitys/Documents/he_128+2014.pdf

peat, it is foreseen that phasing out coal is likely to increase the need for peat as an energy source, at least within the 2020 horizon (TEM 2016b).

Building on the understanding of barriers above, the possible drivers for bringing peat in line with the overall energy tax regime (e.g. by reflecting its CO_2 emissions) are linked with the broader reform of Finnish energy policy, including the tax and subsidy framework that supports its implementation. The key driver and enabling factor for such a change would seem to be to introduce changes to the legislation that underpins subsidies for the production of wood biomass for energy (see section 4.2).

1.3 Revenue collection and use

The revenue collected through the peat tax is channelled to the State's general budget. It is not earmarked to be used for any particular purposes, e.g. to help to support environmental protection or climate change mitigation.

The current level of revenue collected via peat tax ranges between EUR 36-40 million per year (2013 and 2014 figures with tax level of EUR 4.9/MWh, Table 1.2). The revenue has diminished over recent years whilst revenues from a tax on coal have increased. For example, peat tax revenues declined by 25% between 2011 and 2013 whilst coal tax revenues increased by 15% (Finnish Government 2014).

Reducing the tax level back to EUR 1.9/MWh is estimated to reduced annual revenues by around EUR 7-8 million in 2015 and 2016 (compared with the foreseen tax level of EUR 5.9/MWh from 2015 onwards). The related increase in subsidies to wood biomass resulted in EUR 6-8 million extra expenditure pear year (Finnish Government 2014). The resulting negative changes in the overall tax related revenue were, however, foreseen to be compensated by a simultaneous increase in other taxes (e.g. mining).

Table 1.2 Revenue from energy tax in Finland 2013 – 2014 with tax level of EUR 4.9/MWh

Tax	Year 2013 (EUR million)	Year 2014 (EUR million)
Gasoline	1,296	1,302
Diesel	1,272	1,250
Fuel oil (light)	306	265
Fuel oil (heavy)	63	52
Coal	118	102
Peat	**36**	**40**
Gas	131	119
Electricity 1	689	724
Electricity 2	259	258
Pineoil	0.1	0.1
Petrol (aviation)	0	0.1
Gasoline (aviation)	0.8	0.7
Metanol	0.4	0.2
Total	**4,171**	**4,113**

Source: based on Parkkonen (2015)

1.4 Environmental impacts and effectiveness

Peat production has increased substantially over the past three decades, from 1.5 Mt in 1981, 4 million tonnes of oil equivalent (Mtoe) in 1991 and 6.9 Mtoe in 2001 (IEA 2013). The rise can be fully attributed to the low tax rate aimed at maintaining peat as a domestic resource in the energy mix. This special treatment of peat has meant that the tax has been ineffective in addressing environmental impacts associated with the use of peat, increasing rather than preventing them. From the perspective of climate protection, it has been estimated that the exemption of peat from the general energy taxation system results in a need for Finland to reduce overall carbon emissions in other sectors in a manner that is not cost-efficient (Hyyrynen 2013). From the perspective of biodiversity conservation, while adopting (and maintaining) a higher tax rate would help to lower the pressures on peatland ecosystems, the current regime for peat tax is considered to be too politically driven and unpredictable for the instrument to be considered effective for peatland conservation (Aapala and Alanen, personal communication, 2016).

The rate of depletion of peat far outpaces its natural replenishment at mine sites and therefore peat is not considered a renewable fuel (IPCC 2006, IEA 2013)[7].Finland classifies peat as a 'slowly renewing biomass fuel'. Furthermore, the CO_2 emissions associated with burning peat (106 g CO_2/MJ) (Finnish Ministry of Finance 2001) are estimated to be similar or to exceed the emissions associated with coal (IPCC 2006, Hyyrynen 2013). In 2007, 15% of Finnish CO_2 emissions came from peat, although peat only accounted for 7% of energy consumption that year (Hyyrynen 2013). In 2013 8.2 million tonnes of CO_2 equivalent emissions were associated with the production and burning of peat (13.5% of national emissions) (Statistics Finland 2016b). Even the brief 2013-2015 rate increase did not bring the tax to a level that would have reflected the actual CO_2 content of peat.

In addition to the slow renewability rate and high emissions, the extraction and use of peat has had an ongoing negative impact on the status of Finnish biodiversity (e.g. Ylönen and Simola 2012, Turunen 2008). The recently updated legislation for nature conservation stipulates that peat extraction cannot result in a loss of area with significant biodiversity value (Article 13 of Law on Environmental Conservation[8]). Furthermore, a national strategy for the sustainable and responsible use of mires and peatlands was adopted in 2012[9] directing the use of peatlands to non-pristine areas (e.g. peatlands previously drained for forestry purposes). As a part of the implementation of the strategy, a proposal for additional conservation of 117 000 hectares of mires was put forward in 2015 (Alanen and Aapala 2015).

However, it remains somewhat unclear how the above legislation and guidance will be applied and implemented in practice. In particular, there are concerns over the fate of semi-natural peatland areas with possible high local biodiversity and/or recreational and cultural

[7] Since 2006, the UN Climate Convention considers peat as an energy source comparable to fossil fuels (http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf

[8] http://www.finlex.fi/fi/laki/alkup/2014/20140527

[9]http://mmm.fi/documents/1410837/1516663/MMM-119690-v5-suostrategia_valtioneuvoston_periaatepaatos_v4/005425e8-e3c4-497d-8cff-26f343896c37

value that fall outside the legislative protection (Aho personal communication, 2016). Such semi-natural areas are also considered to be important for the purposes of peatland restoration for conservation purposes (Aho, personal communication, 2016). While the restoration of peat extraction areas is in principle possible it is neither a common practice nor it is considered to be able to restore the biodiversity values to the pre-extraction state (Aapala, Halkka and Sulkava, personal communication, 2016).

As regards water protection and the quality of inland water, existing evidence indicates that there can be trade-offs at local and regional level between benefits derived from peat extraction and benefits provided by lake ecosystems. Many summer cottage owners are convinced that peat extraction is responsible for degrading the quality of lakes while fishermen are increasingly concerned that suspended matter and humus from peat harvesting sites accumulate on lake and river beds, destroying spawning habitats. While at the national level the impacts of peat extraction on water quality are limited[10], data from local level shows that the concentrations of solid matter, dissolved organic matter, phosphorus, nitrogen and iron in the run-off water from peat extraction sites are often higher than average (Poyry Consultancy 2009; Selänne and Saari 2012). Furthermore, humus concentration is high in run-offs from several peat extraction sites, causing changes in inland water ecosystems and their species composition and functioning. Humus also decreases water quality by increasing acidity and colouring the water. (Simkin in Kettunen et al. 2012)

1.5 Other impacts

As regards economic and social impacts, peat harvesting is important for the local economy and employment in western, eastern and central Finland (IEA 2013, Aapala and Alanen, personal communication, 2016). These areas are often characterised by the lack of other employment opportunities (Leinonen 2010). The available estimates for the employment created by the peat energy industry vary between 2,200 – 4,000 (direct) (Halkka 2015 and IEA 2013, respectively) and around 10,000 (direct and indirect) (Bioenergia 2010; Flyktman 2009 in Halkka 2015) man-years of employment. It is to be noted that these estimates are based on the consumption of 25TWh of peat per year, with the estimates for current and projected levels of use being less (around 11-20 TWh / year) (Halkka 2015, Environment.fi 2015; TEM 2016b). Over 200 companies and hundreds of entrepreneurs are cited to be currently involved in peat production (IEA 2013). The estimated net benefits of peat extraction (energy) to the national economy have been estimated as EUR 440 million / year (Flyktman 2009 in Hyyrynen 2013). However, it has also been argued that that reduction of peat extraction and energy use would not automatically lead to the loss of jobs in the energy sector, given the increase in the use of other types of biomass (wood) (Suokko 1997 and Monni et al. 2013 in Hyyrynen 2013).

The direct negative economic impacts of the current regime are related to the loss of national revenue due to subsidising the use of peat for energy. The negative welfare impacts are associated with the environmental impacts outlined above, including decreased

[10] Nutrient load associated with peat extraction is estimated to be < 1% of the total N and P emission from anthropogenic sources

local/regional inland water and air quality and possible knock-on impacts on inland fisheries, recreation and tourism (Vesala et al. 2010, Simkin in Kettunen et al. 2013).

2 Stakeholder engagement

and

3 Windows of opportunity

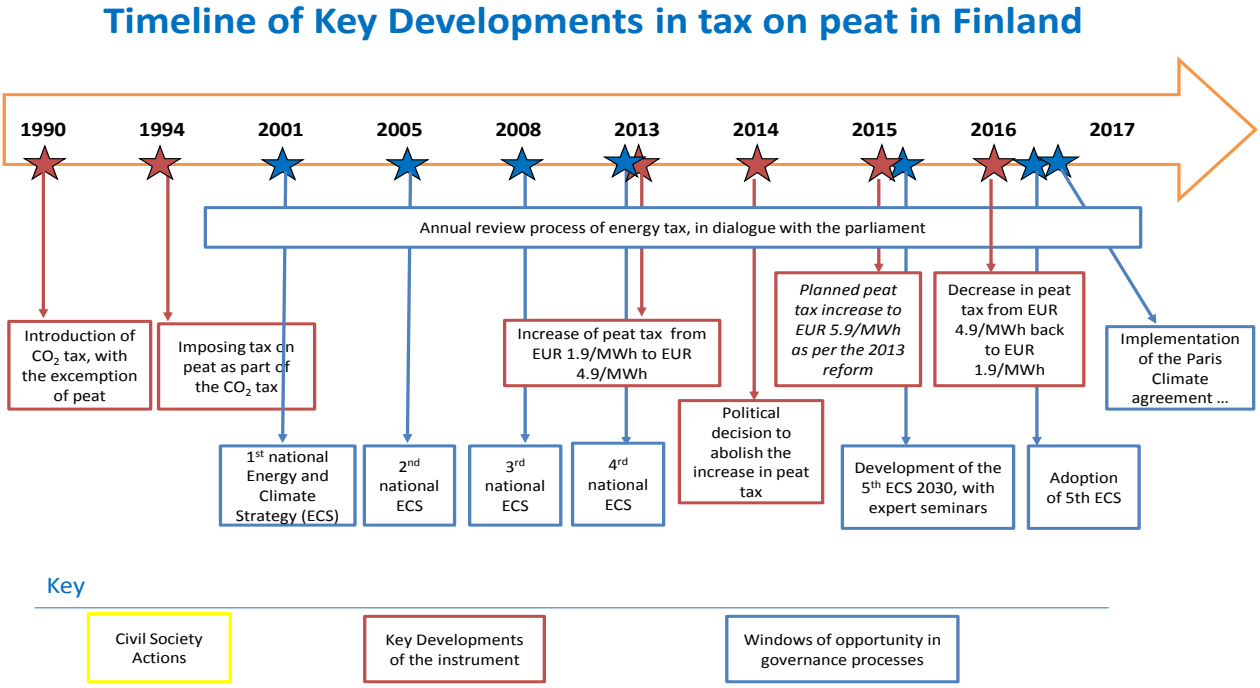
Stakeholder views on the use of peat for energy are highly polarised. In general, the use of peat continues to be strongly supported by the peat industry and a range of local and regional stakeholders whose livelihood depends on peat extraction. Environmental groups and environmentally-concerned citizens oppose the practice on the grounds of nature and climate conservation. Furthermore, a range of stakeholders (e.g. fishermen, summer cottage owners) living in the vicinity of peat extraction areas oppose extraction activities due to potential and/or observed negative impacts on water and air quality (see section 1.4). These contrasting opinions were exemplified during a public hearing process in 2014 that led to the most recent change to the tax level (i.e. from the agreed EUR 5.9/MWh in 2015 back to EUR 1.9/MWh) (Finnish Government 2014).

The key opportunities for public engagement in the decision-making process are outlined in **Error! Reference source not found.** below. In principle, the annual review of energy taxes - drafted by the Ministry of Finance, proposed by the Government and approved by Parliament – provides an ongoing opportunity for stakeholders to submit their views. Furthermore, the development and updating of the national Energy and Climate Strategy (ECS) with its consultation process has offered some opportunities for stakeholder engagement.

However, given the highly political nature of the decision-making process, the above opportunities appear not to have been enough in terms of reforming the tax to internalise the environmental impacts of extraction and use of peat (e.g. in the context of the 2030 ECS). Therefore, changes in the Government (i.e. general elections) seem to offer the key moments to influence the regime. In this regard, the Green Party's role as part of the Government in 2011-2014 is considered to have played a crucial role in increasing the peat tax in an attempt to improve climate and nature conservation (Aho, personal communication, 2016.). However, this also meant that the departure of the party in 2014[11] resulted in the lack of possible opponents to withdrawing from the recently agreed tax increase and finding other alternatives to address the decrease in coal prices.

Figure 1.5.1 Timeline for the development, adoption and implementation of the scheme.

[11] The Green Party left the Government in September 2014 due to the Government reversing its decision not to support the increase of nuclear power in Finland.



4 Insights into future potential/reform

4.1 Actual planned reforms and stakeholder engagement

No major reforms to the peat tax are currently planned. Consequently, the foreseen opportunities for stakeholder engagement to support environmental tax reform are as outlined in Section 2 above.

4.2 Suggestions for future reforms – instrument design and civil society engagement

The complex role of peat in the context of the Finnish domestic energy policy makes it difficult for environmental concerns about peat extraction and use to influence the decision-making process. So far the evidence on negative environmental impacts (climate, water and biodiversity) has been considered secondary to concerns of energy security, employment and competitiveness of the forestry sector.

In its recent national review, the International Energy Agency (IEA) states it is in favour of lowering the subsidy levels for peat in Finland (i.e. increasing the tax) as this is foreseen to promote the use of renewable energy (IEA 2013). The national reviews, however, have estimated that under the current circumstances peat is likely to be replaced either by domestic renewable sources (wood biomass) or imported non-renewables (coal), with the likelihood that energy producers will favour the latter based on its more predictable supply and technical investment needed to move towards 100% wood-burning technology (see section 1.2) (Pöyry 2012). While the national ECS anticipates a phase-out of coal by 2030, even the shift towards wood-based renewables is not foreseen to take place without wider repercussions. The increased demand on wood biomass for energy is said to increase the price

for wood across the forestry sector, creating competition between the different uses of wood within the sector and therefore negatively affecting the overall competitiveness of the sector (TEM 2010, Pöyry 2012). However, it has also been estimated that current changes within the forest sector are already leading to the oversupply of wood biomass, creating opportunities for the increased use of wood for energy purposes (Hetemäki & Hänninen 2009).

Consequently, it appears that the possible future reform of Finnish peat tax to internalise the environmental externalities linked to the energy use of peat requires a broader reform of the current framework governing both the use of energy sources and support to the reform of the forestry sector. Signals from the EU and/or international level could function as drivers for such a change in the future. For example, peat is currently exempted under the EU Energy Tax Directive (2003/96/EC); in principle changes to this would create pressure for Finland to address peat similarly to other energy sources. However, changes to any tax related EU legislation would require unanimity among the Member States which means thay are likely to be politically unfeasible. Alternatively, the EU Regulation for state aid could be updated to include provisions that prevent Member States subsidising any domestic energy source with high CO_2 content. Finally, the implementation of the 2015 Paris Climate Agreement, with its call to protect natural carbon sinks and storage[12], could create an incentive for changes in the Finnish national regime.

Given the identified technological challenges, the regime shift from the use of combined peat-wood to wood-only biomass seem to first and foremost require willingness to invest in the technological innovations that could offer a path towards upgrading current boiler technology.

4.3 Suggestions for replicability

Given the country-specific circumstances and political nature of the Finnish peat tax, the experiences linked to the development of the instrument are not replicable in other EU Member States. However, the case study can be used to highlight the possible complexities related to environmental tax reform, including barriers created by the interplay with other sectoral policies.

[12] Article 5 of the Paris Agreement: "Parties should take action to conserve and enhance, as appropriate, sinks and reservoirs of greenhouse gases as referred to in Article 4, paragraph 1(d), of the Convention, including forests." https://unfccc.int/resource/docs/2015/cop21/eng/l09.pdf

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