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National and global regulatory challenges for the peat industry – with a particular focus on growing media

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1. Background and task

The time in which we live is becoming more and more fast-paced and the pace at which technology is developing and social conditions are changing is already breathtaking in some respects. For a very long time (a hundred years) very little had changed due to the development of peatlands. Peat was cut and used by farmers for fuelling domestic fires. Another major use of peatlands was for agriculture: draining them and converting them into land suitable for cultivation.
The idea of nature conservation became popular in society in the second half of the last century. Environmental NGOs started to demand certain standards for peatland management, along with new legislation. For peat extraction, new peatland management standards involved:

- restrictions on land availability (nature conservation areas were not available),
- more complicated application procedures (compensation for impacts),
- greater efforts in follow-up/post-extraction use (rewetting and restoration).

Towards the end of the 20th century, climate change became a topic of global concern. After decades of efforts at conferences and in other political discussions, the Paris Climate Agreement came into force in 2015 with calls for a drastic reduction of greenhouse gases down to a quote of 5% to 15% of pre-industrial level until 2050. Energy peat use has already declined significantly in recent years being the reason for 50% of peat extracted in Europe. This development was initiated and forced by the changes to the EU subsidy policy in favour of renewable energy sources.

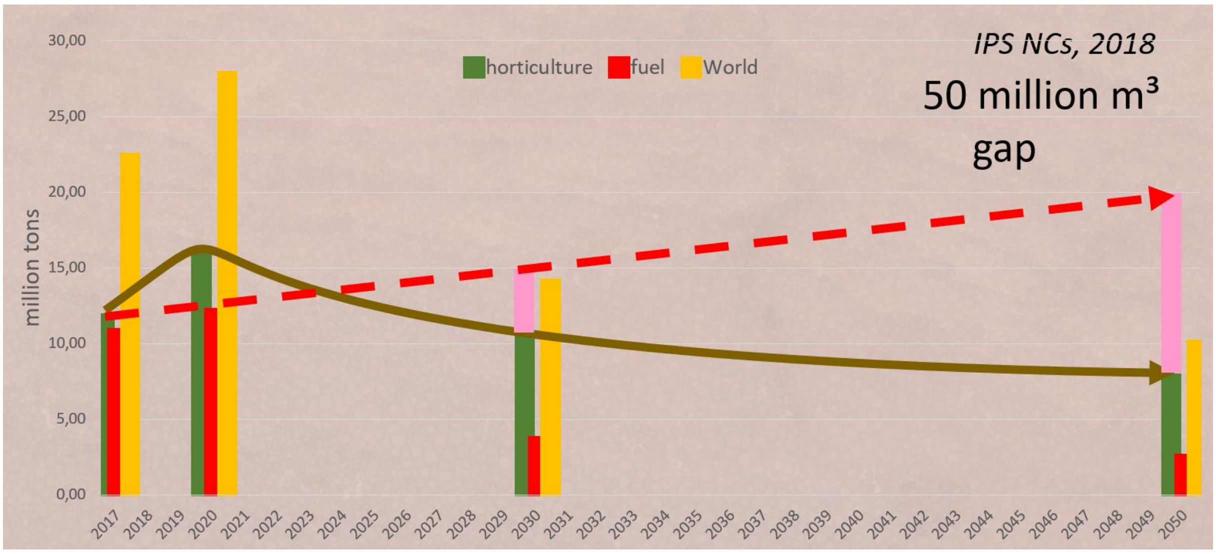


Figure 1: Development of peat extraction and estimated demand for peat for growing media (GM) until 2050, in million tons. (Data sources: IPS 2018)

On the other hand, the world's population will grow to 10 billion by 2050. Together with rising prosperity, the demands on food and living conditions will increase. As a result, this leads to a quadrupling of demand on growing media. Even if new cultivation systems, such as hydroculture, are emerging and alternative constituents are used in higher proportions, there will be a higher need for peat for the production of growing media in the future. Today, peat is by far the largest component of growing media. For reasons of quality, technical processability and efficiency, and the current economic success of the horticulture industry, it is very unlikely that there will be a reduction or replacement of peat within growing media. The peat industry and growing media producers will be faced with these contradictory challenges:

- how to reduce greenhouse gases,
- how to increase growing media

2. Discussion on influencing factors

The following definitions and descriptions are given to facilitate a common understanding of this topic.

- Sustainability of growing media (GM)

Sustainability is not defined just by ecology – economic and social aspects have to be taken into account if developments or solutions are to have more chance of being successful in the long run. The availability of GM has to be of a sufficient volume, quality and at a responsible price to match the demand from the food production and ornamentals industry. At the same time production of GM must be executed with the lowest possible ecological and climate footprint. Certification systems, like RPP (*www.responsiblyproducedpeat.org*) or Veriflora (*www.scsglobalservices.com/services/veriflora-certified-sustainably-grown*), can be used as instruments to improve the sustainability of the industry.

- Necessity of supply

In addition to contributing to our food supply, peat can be important for providing people with other basic human necessities. Greening and green areas, which can be provided by peatlands, in our ever expanding urban centres have positive effects on the reduction of air pollution, control of urban climate and promotion of social cohabitation.

	2017	2050	
	Mm^3	Mm^3	Demand increase %
Vegetables	19	48	255
Ornamentals	40	196	491
Total	**59**	**244**	**415**

Table 1: Estimated total growing media market 2017 – 2050 -IPS (2018)

- Proportion of peat in growing media for different applications

Different applications demand different qualities and mixtures of growing media. Products for the hobby market have higher proportions of compost and other renewable components. Even if they play nearly no role in the absolute amount, there are also peat-free products on the hobby market. It is much more difficult to reduce peat in higher proportions for the commercial grower.

Growing media constituent category	m^3 in 000's acc. to EN 12580	% of total
Peat (H1 to H10 bog and fen peat)	25990	75.1
Organic constituents other than peat (excl. composts)	3740	10.8
Composts	2748	7.9
Mineral constituents (incl. 530 pre-shaped substrates)	2131	6.2
Total all categories	**34609**	**100.0**

Figure 2: Total reported amounts of constituents used for the production of growing media for the professional and hobby markets in 16 EU countries – Schmilewski (2013)

- GHG emissions from growing media

The sources of greenhouse gas (GHG) emissions have to be differentiated (e.g. Fig. 4), and comprise those generated from:

  - the extraction process at the extraction site,
  - the GM production in the plant and subsequent transport of the product,
  - the emissions from horticultural use until end of life.

The responsibility of the peat industry towards mitigating its GHG emissions has to be defined, and the carbon footprints of different growing media, with different proportions of renewable materials, have to be analysed.

Tab. 15: Freisetzung von Kohlendioxid bei der Torfgewinnung und Torfnutzung
Carbon dioxide emission at peat excavation and peat use

Teilprozess	**Kohlendioxidfreisetzung** kg C m^{-3}			**Autoren**
	Mittelwert	min	max	
1. Torflagerung	0,7	0,3	1,0	KIRKINEN et al. (2007)[a]
2. Maschinen	0,5 0,5	0,2	0,7	KIRKINEN et al. (2007)[a] HOLMGREN et al. (2006)[a]
3. Torfnutzung - Torfverbrennung - gärtnerische Torfnutzung	48,9 48,5 50,0	48,6	49,1	KIRKINEN et al. (2007)[a] HOLMGREN et al. (2006)[a] eigene Berechnung[b]
Summe (1.+2.+3.)	**50,3**			

[a] Umgerechnet mit einem Energiegehalt der Torfe von 1692 MJ m^{-3} (KIRKINEN et al. 2007); [b] berechnet mit einer Dichte der Torfe von 100g/l und einem C-Gehalt von 50%

Tab. 16: Freisetzung von Methan bei der Torfgewinnung und Torfnutzung
Methane emission at peat excavation and peat use

Teilprozess	**Methanfreisetzung** kg C m^{-3}			**Autoren**
	Mittelwert	min	max	
1. Torflagerung	0			KIRKINEN et al. (2007)[a]
2. Maschinen	0,001			HOLMGREN et al. (2006)
3. Torfnutzung - Torfverbrennung - gärtnerische Torfnutzung	0,011 0,006 keine Informationen	0,008 0,000	0,013 0,000	KIRKINEN et al. (2007) HOLMGREN et al. (2006)
Brenntorf: Summe (1.+2.+3.)	**0,009**			
gärtnerische Torfe: Summe 1.+2.	**0,001**			

[a] Umgerechnet von g MJ^{-1} in kg m^{-3} mit einem Energiegehalt der Torfe von 1692 MJ m^{-3}

Tab. 17: Freisetzung von Lachgas bei der Torfgewinnung und Torfnutzung
Nitrous oxide emission at peat excavation and peat use

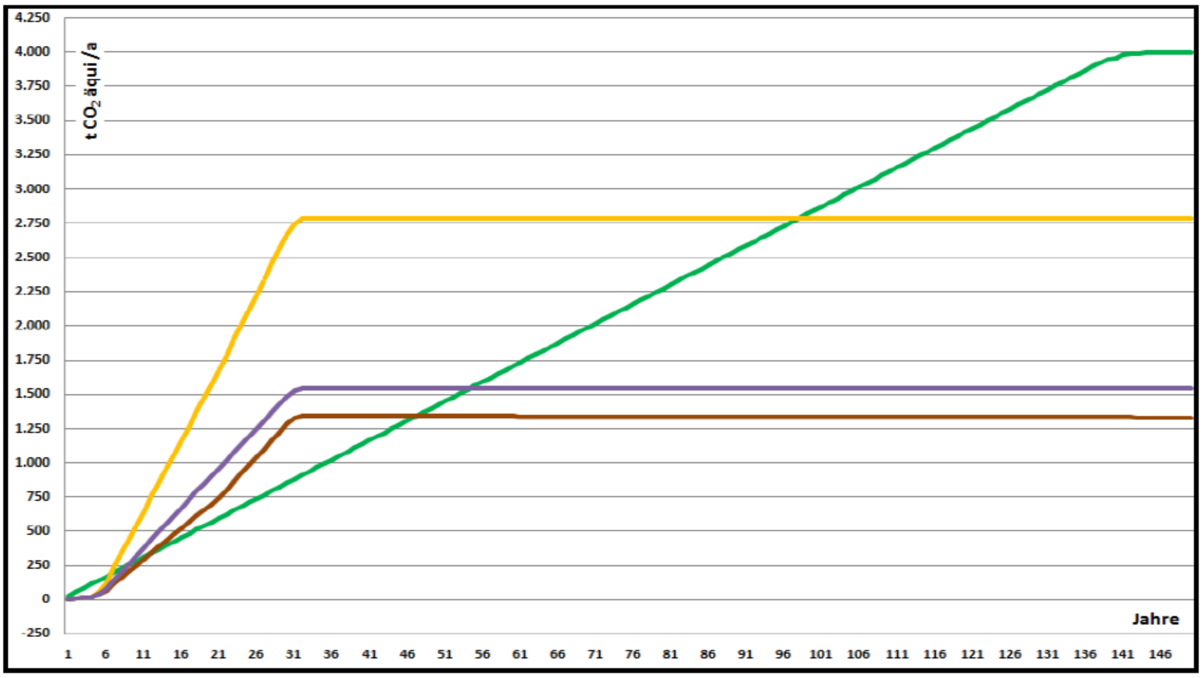
	Lachgasfreisetzung kg N m^{-3}			**Autoren**
	Mittelwert	min	max	
1. Torflagerung	0			KIRKINEN et al. (2007)[a]
2. Maschinen	0			HOLMGREN et al. (2006)[a]
3. Torfnutzung - Torfverbrennung - gärtnerische Torfnutzung	0,014 0,001 keine Informationen	0,003	0,024	KIRKINEN et al. (2007) HOLMGREN et al. (2006)
Brenntorf: Summe 1.+2.+3.	**0,007**			
gärtnerische Torfe: Summe 1.+2.	**0**			

[a] Umgerechnet mit einem Energiegehalt der Torfe von 1692 MJ m^{-3}

Table 2: GHG emissions from peat extraction, storage, machine use and extraction sites (Höper 2017)

- GHG emissions from peatlands under different uses

Peatlands under different uses and in different stages of degradation and regeneration have different patterns of GHG exchange. Natural peatlands are more or less neutral in their GHG exchange. Drained peatlands are GHG sources. The quantity depends on the intensity of drainage and use.
To find the best solution for peatland management, it is important to compare GHG emissions under the same circumstances and situations. For example, if you add up all GHG emissions from GM production, from extraction to end of life, the same full accounting must be performed for peatlands used for agriculture. If it is a grassland being considered, GHG emissions from the cattle, the use of machines, fertilizers and harvested and exported biomass all have to be taken into account.
GHG emissions from extraction sites are comparable with those from natural bogs in a degraded state. Turning agriculturally used peatlands into extraction sites directly lowers GHG emissions. Rewetted areas have higher methane emissions for an unknown period of time. The rewetting of peatlands under agricultural use has to be carried out carefully in order to minimise methane emissions: firstly the vegetation must be removed and then the fertilized top soil layer. The depth of top soil/peat removed has to be analysed in each single case.



green line: ongoing agricultural use, blue line: rewetting and restoration, brown line: peat extraction and horticultural use deeper than restoration, yellow line: restoration, peat extraction and horticultural use

Figure 3: comparison of accumulated GHG emissions under ongoing agricultural use, restoration and peat extraction (NABU-IVG-Concept 2014)

3. Proposed solutions for the peat extracting industry

Protecting our climate from ongoing change and ensuring a sustainable food supply are equal needs of society. Hence food supplied using growing media has to take GHG emissions reductions into account and actions to minimise climate change must not jeopardise future food supplies.
A concept describing how peatlands can be managed sustainably over the decades to 2050, within the context of these global challenges, must be developed, and led by IPS. The following milestones are needed in order to deliver this concept:

Basic data

- Data on current peat extraction (volume and quality) and the different uses of that extracted peat should be collected.

- An estimation of future demand for GM and peat should be modelled based on the data from IPS Project Peat for Food and Quality of Life.
- Knowledge on emission factors resulting from different land use scenarios/situations (extraction sites, natural bogs, rewetted sites, reforested sites, different agricultural after-use) must be generated in a meta study.
- A research project is required that analyses the GHG emissions throughout the whole life cycle of peat used in growing media.

Potential proposals from the concept

- Development of new peat extraction sites shall prioritise already damaged and drained peatlands (see: Wise Use of Mires and Peat, Strategy for Responsible Peatland Management, Responsibly Produced Peat).
- Overcut extraction sites shall be rewetted (see: WUMP, SRPM, RPP).
- Renewable materials shall be used in as high as possible proportions, adapted for each different use (e.g. hobby market, professional substrates).
- Until 2050 GHG emissions from GM shall be reduced as near as possible to the aim of the 2015 Paris Agreement.
- As long as peatlands are under agricultural use and not rewetted, they are available for GM production, because this lowers the on-site emissions and leads to rewetting or an after-use that emits lower levels of GHGs.
- GHG emissions from peatlands used in agriculture and forestry generate 96 % of the total emissions resulting from peatland use. Thus a sole reduction of the 1.7 % GHG emissions from the peat extracting industry (including peat for energy use) will be relatively insignificant.
- Therefore a direct functional interrelation between GHG emissions from peatlands used for agriculture and from GM has to be defined and established.
- A connection between the developments of renewable materials and GM production shall be defined:
  - If new renewable materials, with an acceptable quality and at a responsible price, are available, the GM industry has to use them (self-commitment).
  - As long as those materials are not available, the GM industry is allowed to use peat.
- The GM industry documents regularly its efforts to develop renewable materials.

4. Conclusion

The peat industry has to develop a 2050 Concept for the use of peat in growing media. This concept must describe how the industry will undertake serious efforts to fulfil the demands of the Paris Agreement. The growing media industry is not able to solve the problem of GHG emissions from peatlands with the 1 % it is responsible for. It is not responsible for phasing out peat from GM production under the conditions that:

- Renewable materials are not available at the required quality, in the necessary volumes and for a responsible price.
- The GHG emissions from peatlands used for agriculture and forestry (97 %) are not reduced – the reduction has to go hand in hand for all stakeholders and peatlands.
  This concept has to be developed until 2020 in a first draft. Milestones must be set every 3 to 5 years, and monitoring performed to assess the clear indicators of change, for example:
  - The percentage of peat in GM production,
  - the availability of renewable materials and their use in GM,
  - the progress towards reducing GHG emissions from peatlands under agricultural and forestry use.

Based on the outcomes of the monitoring, the concept's aims will be adapted.

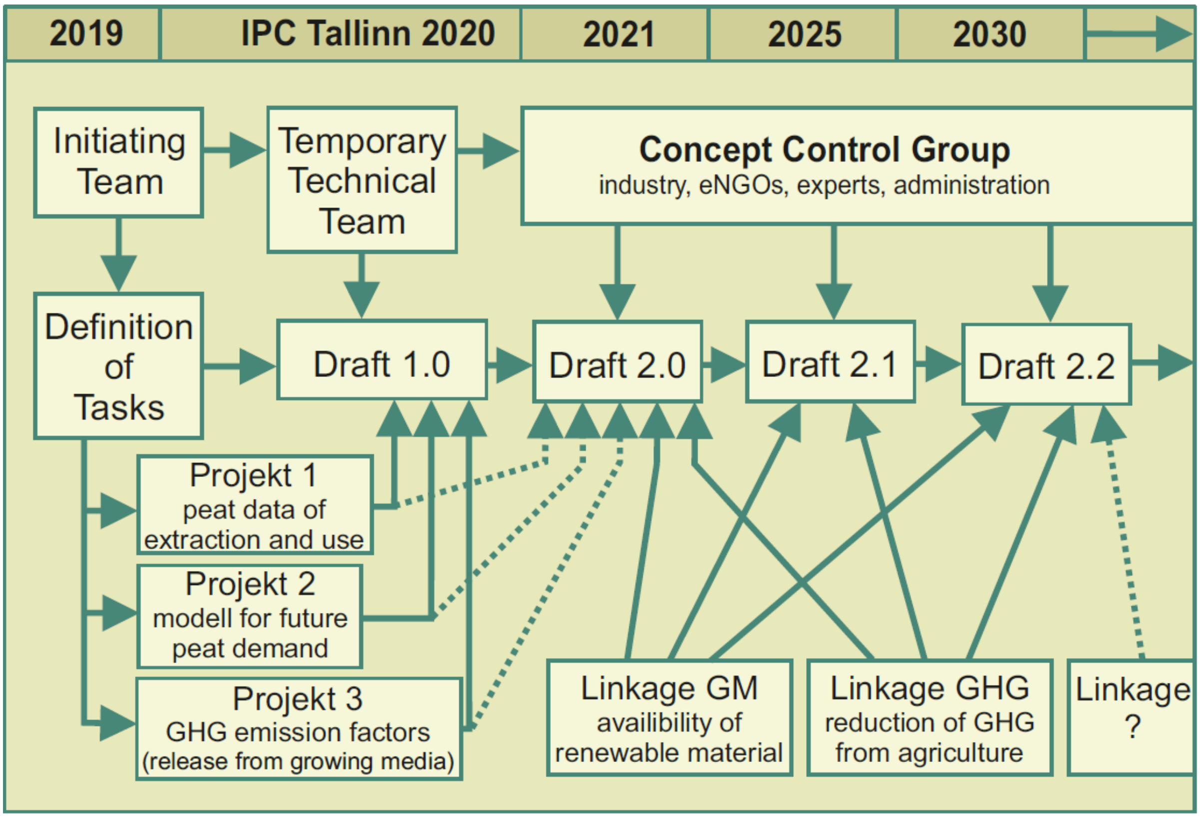


Figure 4: Draft of a possible structure of a "Peat Concept 2050".

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