ENERGY PEAT POSITION IN EU COUNTRIES

AND

ALTERNATIVE USAGE POSSIBILITIES

In Baltic Peat Producers Forum, Palanga, Lithuania, September 5, 2019

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With a great support of energy peat companies and national peat producers associations – Thank you!

SUMMARY: 50 TO 70 % OF ENERGY PEAT PRODUCTION SITES AVAILABLE FOR GM PRODUCTION DURING 2020'S

Energy peat usage will cut down by an rough estimation with 50 to 75 % by volume in all energy peat countries alltogether until the end of year 2029. Degrease may be up to 14-15 million cubic meters in the EU area.

Released production areas are to some extent available for GM industry and in the production of new peat based products like e.g. activated carbon, composite products or chemical products.

Please pay attention: 2020's estimations below are very rough estimations!

	FINLAND	IRELAND	SWEDEN	ESTONIA	LATVIA	LITHUANIA
Energy peat prod. area now, ha / m3	40.000	21.000 (H. Salo, IPS)	6.000	10.000 ha but 300.000 m3	4.000 ha but 100.000 m3	150.000 m3
Release, %	50	50-100	50	??		??
Release*, ha	15.000		3.000	??	Hardly any	Hardly any
Release*, m3	6.000.000	8.000.000	500.000	??	Hardly any	Hardly any

*) Some reduction assumed because of afteruse, licencing etc etc

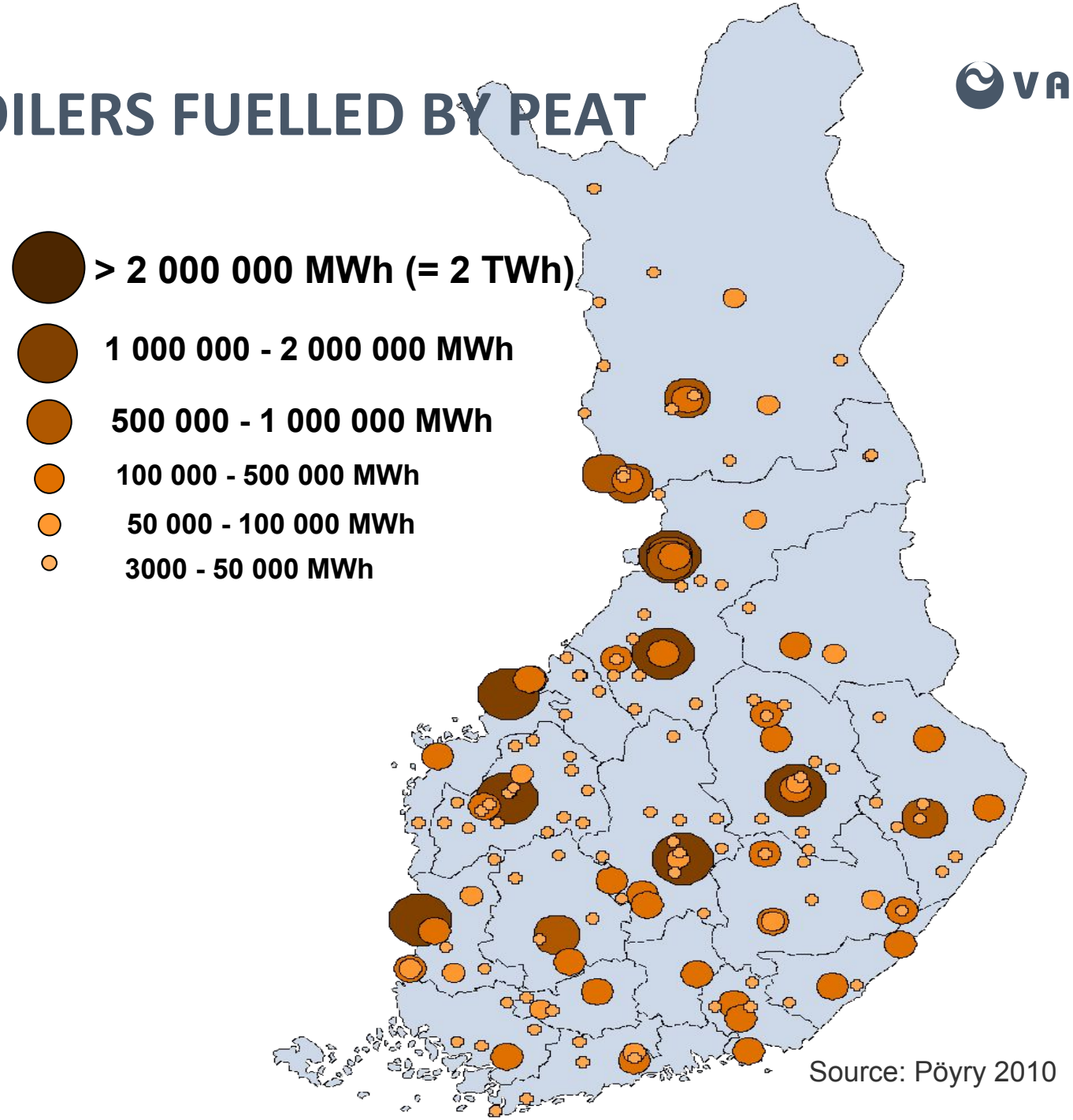
CASE FINLAND

POWER PLANTS AND BOILERS FUELLED BY PEAT

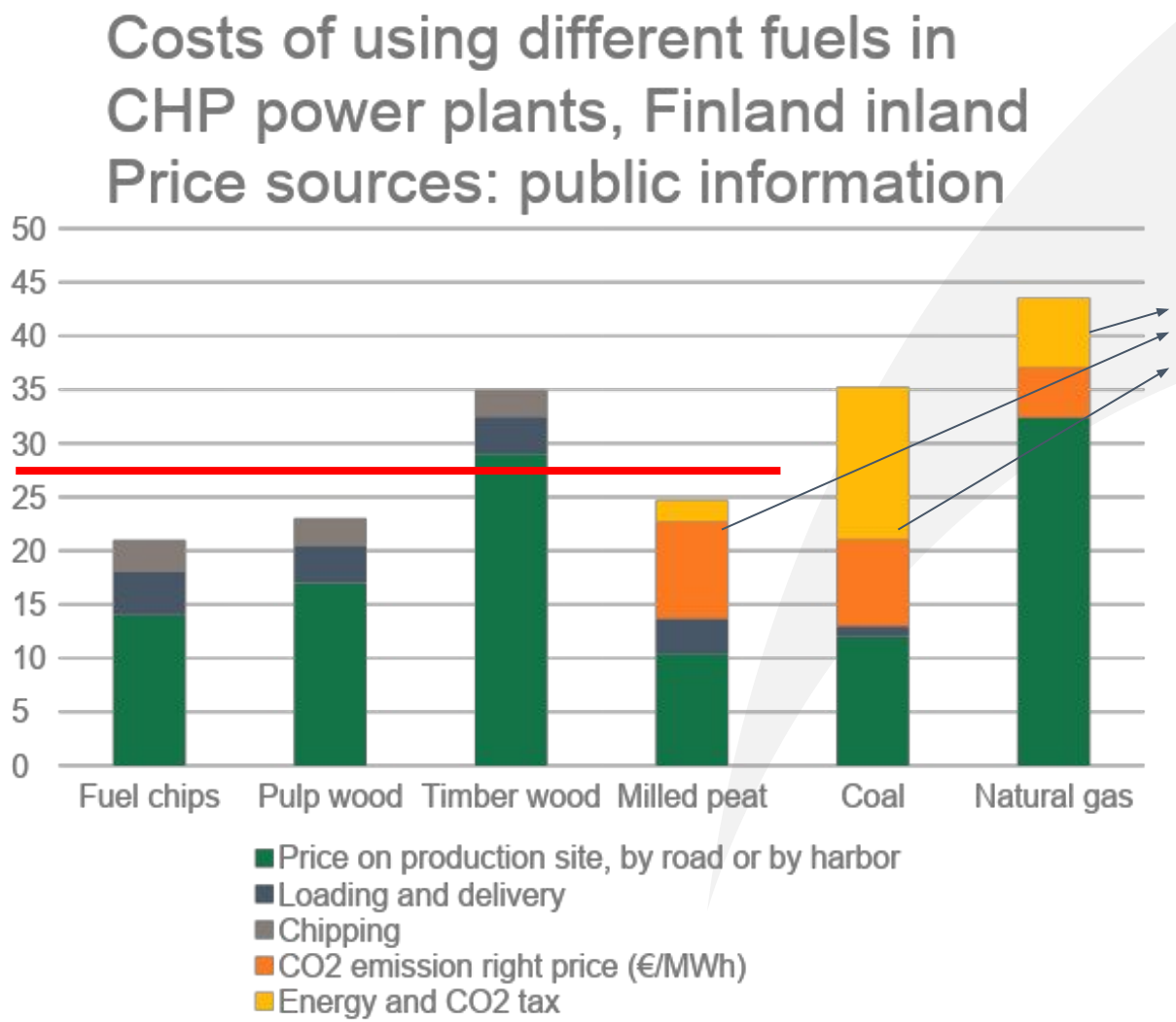
Around 60 power plants (mostly CHP) and more than 120 heat boiler plants use peat together with wood-based fuels.

Around 600 000 people in Finland live in homes that are heated by peat.

Peat fuels around 20% of all CHP production in Finland.

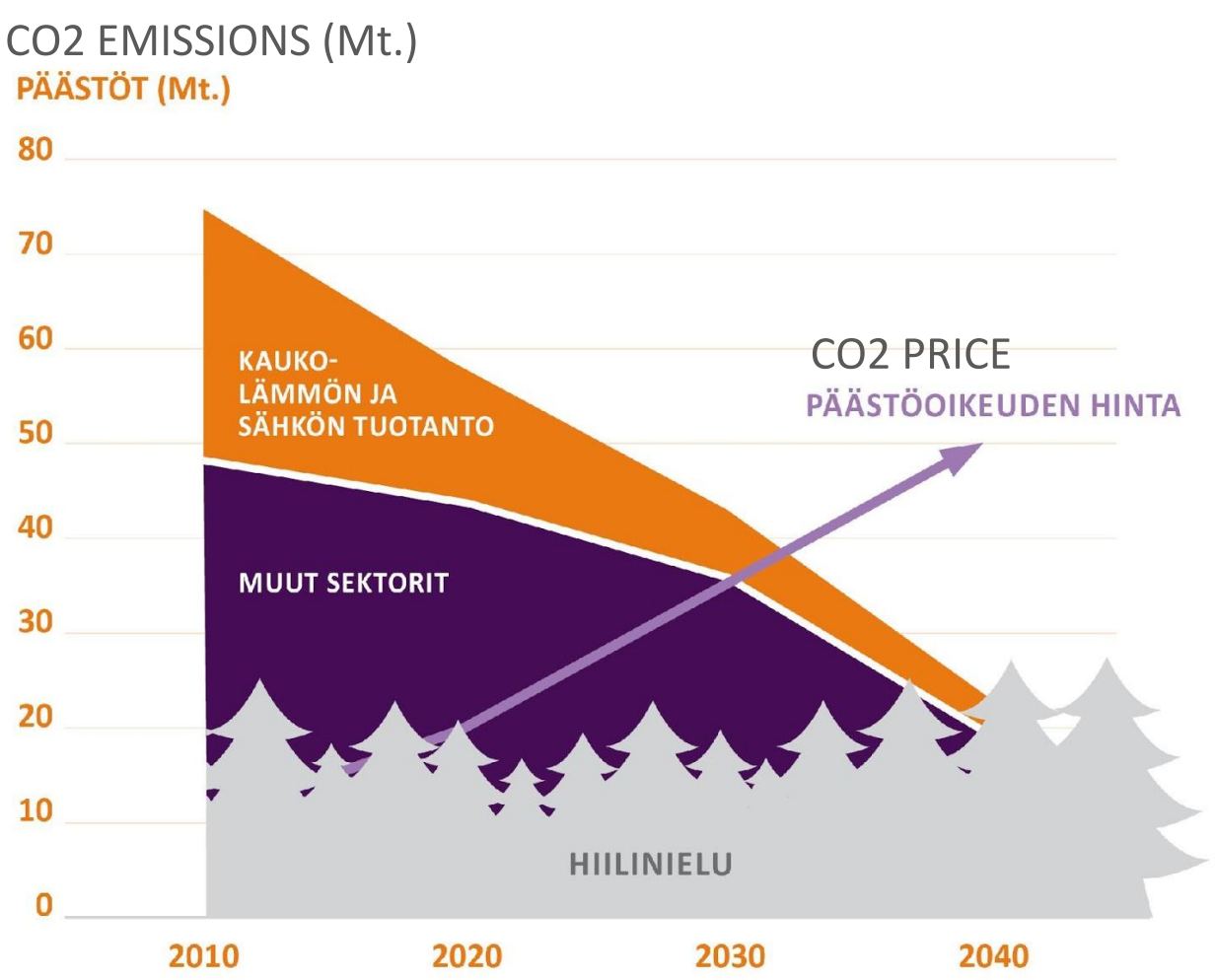


Source: Pöyry 2010



Graph source:
https://www.spglobal.com/platts/en/market-insights/latest-news/electric-power/071119-factbox-eu-co2-price-hits-11-year-high

Finnish energy industry association: Finland climate neutral during 2030s?



Development shown in the picture is adapted by the new Government Energy Policy in Finland:

- Coal is banned by 2029, but not other fuels
- Politicians trust market forces (CO2 emission allowance price) will make a shift from fossil fuels to climet neutral energy production

Colours:

- Orange: district heat and combined electricity production CO2 emissions
- Blue: other sectors
- Arrow: price of carbon allowances
- Forrest below: Carbon stocks (to slightly grow)

ENERGIATURPEEN TUOTANTO JA KÄYTTÖ KULUTUSSEKTOREITTAIN

Energy peat in Finland: production and usage is declining

Vuoden 2015-2017 osalta sektorikohtainen kulutus arvioitu perustuen tilastokeskuksen ennakko

Bars: production

Lines:Usage in different segments

* vuodet 2015-2017 kulutuksen osalta tilastokeskuksen tietoihin perustuvia arvioita sektorikohtaisesta kulutuksesta, vuosi 2018 tuotannon osalta arvio

Lähde: Tilastokeskus ja Bioenergia ry

In Finland total demand of fuels will decrease, but: Wood fuels grow and replace fossil fuels and peat

Use of energy peat will get less by 50 % by 2030 in Finland and during 2030' it's going to be in the marginal only as reserve fuel.

Different fuels from up to down:

Black: other fossil fuels (waste)

Dark green: other renewables (biowaste, gases)

Light green: wood fuels

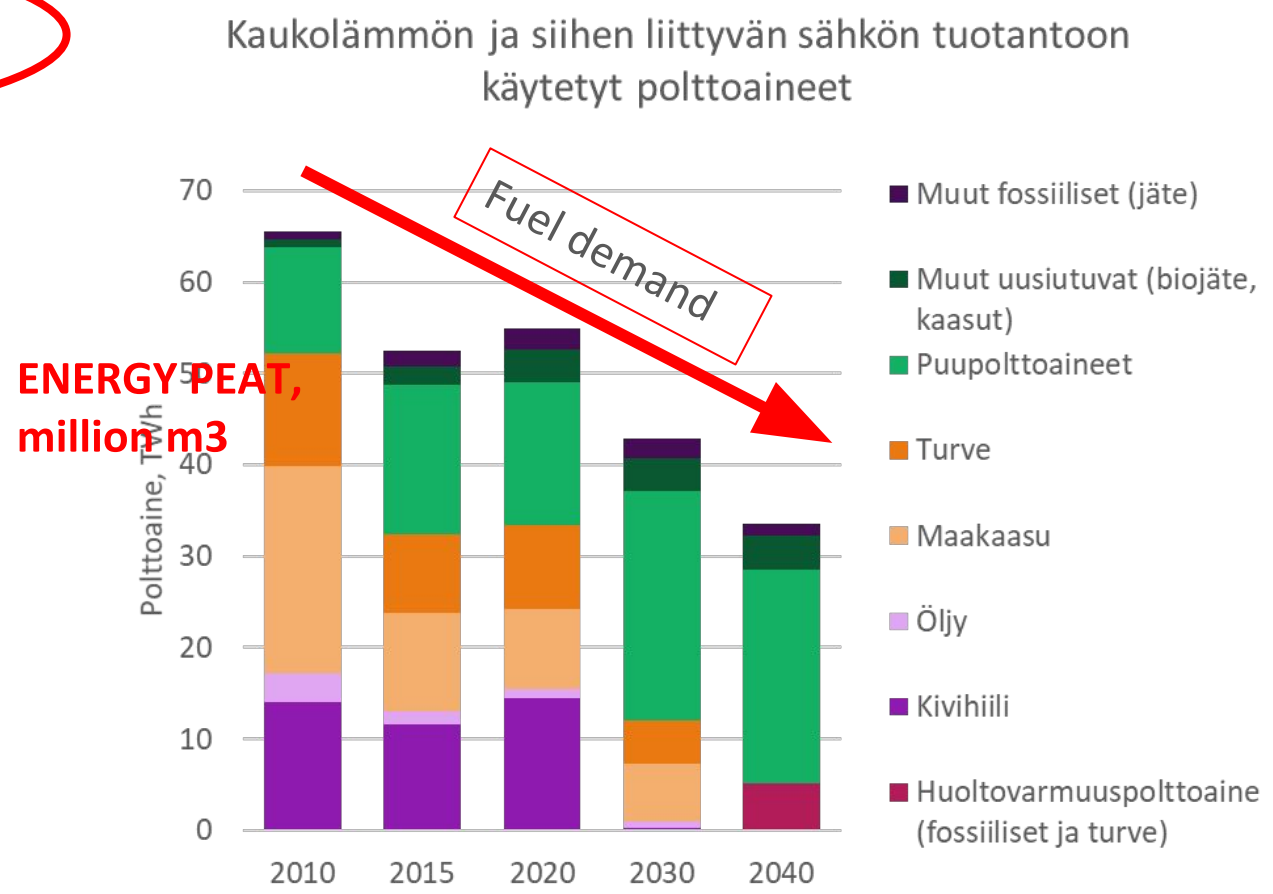
Orange: peat

Light orange: natural gas

Light purple: oil

Dark purple: coal

Red (during 2040s): security of supply fuels (peat and fossil fuels)



Current statistics of peat industry in Finland

by Mr Hannu Salo, The Bioenergy Association of Finland

Environmental permits for peat production	66.000 ha
- of which active production area in 2018	48.660 ha
- of which **energy peat production**	**41.000 ha**
- new environmental permits for peat production	~700 ha/yr
- actual peat production areas released to after-use	3.000 ha/yr (estim.)
Peat producers (having permits)	~90 companies
Small peat extraction areas (<10 ha, no licence)	~380 entrepreneurs

Special feature in Finland: High percentage of white peat is used for animal bedding purposes, in some years up to 60% of all non-energy peat.

Bioenergia

Case Ireland

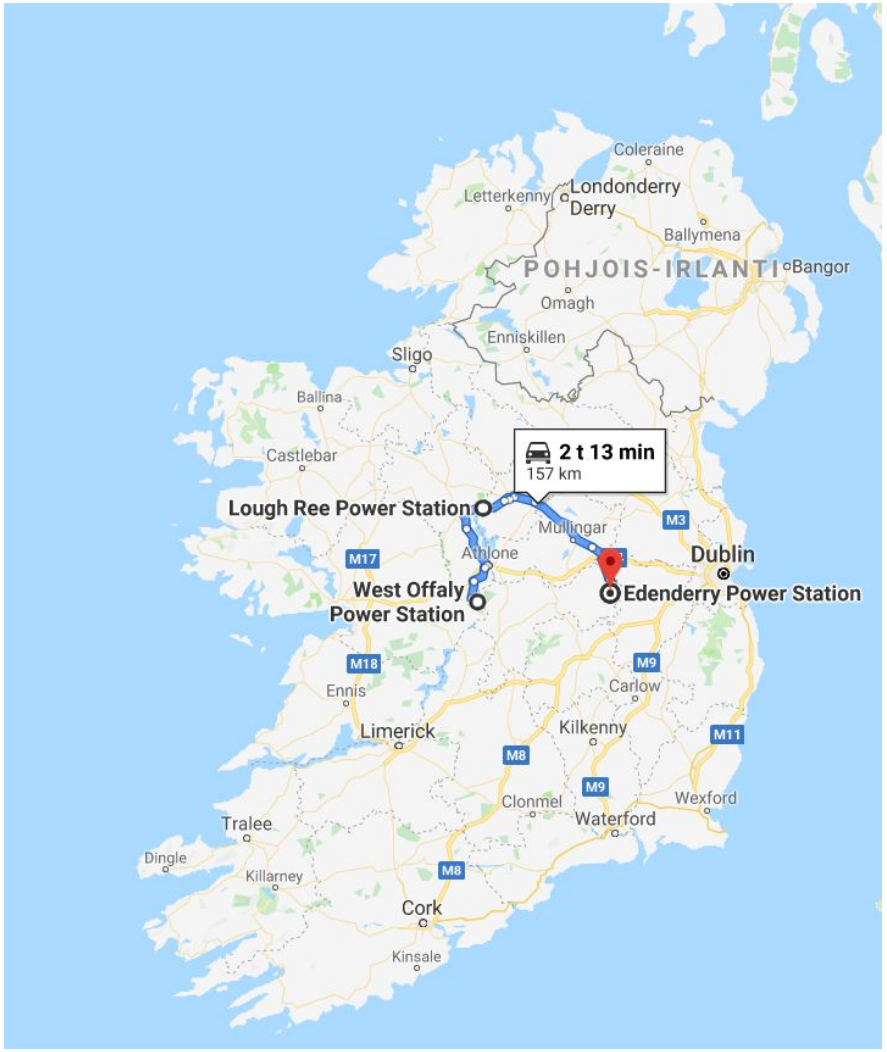
IRISH ENERGY PEAT CONSUMTION HAS LATELY BEEN AROUND 8 MILLION M3 (3 MILLION TONNES)

There are three peat fired power plants in Ireland:

- **ESB owned 100% peat-fired power stations: West Offaly Power (150 MW) and Lough Ree Power (100MW).** Combined annual peat consumption: 2.2 million tonnes
- **Bord na Mona-owned Edenderry Power (128 MW)** using currently 40-50% biomass; annual peat consumption 500,000 to 600,000 tonnes
- In addition **Bord na Mona's briquette factory** Derrinlough; consumes peat 330,000 tonnes /a

⇒ **Total annual energy peat consumption is** 3.1 million tonnes (approx.) ≈ 7-8 million m3

Just now: the 2 power plants on the river Shannon have run with reduced load or have been totally shut because of the hot summer weather (low river levels relative to hot water discharge)



IRELAND: PEAT POWER OUTLOOK FOR 2020'S

- ESB's two plants need new environmental licenses (planning permits) after 2020. It may happen that new licences are not granted because of climate reasons. If so would happen, no more new energy peat needs to be produced for those plants.
- Bord Na Mona's Edenderry plant has co-firing permission until 2023. If two earlier mentioned plants will not get a new permission for burning peat, the same might happen with Edenderry plant. If so, energy peat needs to be produced until 2021.
- Peat briquettes consumption decreses:
  - Carbon tax
  - Younger generation has climate concerns and do not want to use peat briquettes
  - There is also a risk of air quality restrictions affecting the market

  ⇒ It is an open question how many years peat briquettes have markets
- In addition energy peat production sites may face new environmental licencing obligations

CASE SWEDEN

AROUND 500.000 CUBIC METERS ENERGY PEAT MAY BE RELEASED TO OTHER USE DURING 2020' IN **SWEDEN** 1/2

- Energy peat is used in energy production around 1.100.000 MWh/a (more than one million cubic meters)
- Peat is used in medium size heating centrals as well as in bigger combined heat and power plants (CHP)
- Swedish Government does not have any strict oppinnion in energy peat (not positive nor negative). Energy peat is fairly small issue in Sweden
- Some energy peat customers (energy companies) have climate targets (as companies or as part of city policies) which will effect on using peat
- High CO2 emission allowance price (now around 25 €/CO2 t = around 8 €/energy peat cubic meter) will cut down usage of energy peat

SWEDEN, 2/2

- During 2019-2020 the use of energy peat may decrease 150.000-200.000 MWh (≈cubic meters)
  - One energy company has stopped using energy peat because of too high CO2 emission allowance price
  - Two companies have already reached climate neutrality, no peat is used
- During 2020-2030 energy peat usage may cut down with 50 % (this is an estimation)

Consequences:

- Energy peat area in Sweden is now about 6000 hectares
- => 3 000 hectares production area or 500.000 cubic meters of energy peat annually may be relaesed to alternative use during 10 years
- Guality of energy peat is often suitable for GM directly or as part of raw material mixture. Some growing media factories in Sweden already use typical energy peat production site peat in GM production.
- Biggest challenge to shif from energy peat to GM peat may be logistics: Some production sites locate far away from GM factories or away from potential export harbors

CASE ESTONIA

ENERGY PEAT MARKET QUITE STABLE IN ESTONIA, 1/2

- Currently energy peat is used around 100.000 tons ≈ 300.000 m3 in combined heat and power plants as well as in heating centrals
- During next few years no remarkable demand changes are expected
- During 2020's energy peat usage may get less due to higher CO2 price and technical changes in burning technology
- Also subsidies in wood fuel usage may change (drop out) having a positive effect in using energy peat
- Estonian Govenment has no solid oppinnion in energy peat: it is appreciated but it has an impact in national CO2 accounting. In the future energy peat may prevent the Government to reach national climate targets.
- Right now energy peat usage is seen mainly positively: it is the cheapest fuel except for oilshale. Peat is traditional and local fuel. It's harvesting is organised sustainably, and there are no major public debates about it.
- At the moment energy companies value energy peat and there is no pressure from consumers. Energy peat usage depends on technical characteristics, price of the fuel and price of the CO2 and other costs like ash handling

ATTITUDE TOWARDS PEAT IS NEUTRAL IN ESTONIA

- There are about 10.000 hectares peat production area suitable for energy peat production. If needed, more area available.
- Some sites are suitable for growing media production, some not.
- Because of the weeds and higher mineral content there are sites that may be difficult to use for horticultural peat purposes. So far the wisest usage is to use for energy and after that to plan after usage.

SUMMARY

Energy fuel is very marginal topic in Estonia and not so important on the national level. Only regionally where peat is used more, like in Tartu, it is valued more. The general attitude towards peat is neutral.

CASE LATVIA

ENERGY PEAT PLAYS MARGINAL ROLE IN LATVIA

- Energy peat has not paid a specific role in Latvia for a long time
- In Latvia energy peat is currently used 35.000 – 40.000 tons ≈ 100.000 m3 in private housholds and small heating centrals, not affected by CO2 allowance prices
- Usage of energy peat is assumed to stay at the same level
- CO2 tax is not needed to be paid when energy peat is used

THE FUTURE:

- It is likely that new legislation does not support build up new energy peat based heating centrals
- There are 4.000 hectares sites suitable for energy peat production: most of them are used for production of peat for horticultural purposes already

CASE LITHUANIA

HARDLY ANY ENERGY PEAT IN LITHUANIA IN THE FUTURE

- Energy peat usage was about 50.000 tons ≈ 150.000 m3 last year. Peat was used small areal district heat plants.
- In addition significant quantities of briquets and half-briquets coming from Belarus.
- Energy peat usage will be in the same level or will go a bit down.
- The are no possibilities to use energy peat in big or medium power plats by EU regulation and high price of CO2 permissions.
- By research made 5 years ago in Lithuania, the situation is as follows:
  - 118 bogs deposits explored in detail: about 160 million tons of fuel peat available
  - 716 bogs pre-surveys: about 360 million tons of fuel peat available
  - 41 peat bogs are in operation: about 16.6 million tons of fuel peat available

THE FUTURE

- There are no decisions about future plans, but it looks like sites will be closed and energy peat is not used anymore. Public opinion is quite neutral. All policy decisions are based on EU regulation.

Total consequences of energy peat decline in EU countries

What will happen to security of supply and self – sufficiency?

Energy import dependency

EU imports > 50% of energy needs

Finland	~ 70%
Ireland	~ 85%
Sweden	~ 40%
Estonia	~ 12%
Latvia	~ 60%
Lithuania	~ 80%

Local solid fuels had remarkable demand peak in Baltic Sea countries in winter 2017-2018

An exceptionally wet autumn and a long cold period early year 2018 resulted in low-quality biomass fuels and a shortage of e.g. wood fuels.

Finland

- A number of cities tapped into energy peat reserves to secure adequate supply and avoid resorting to imported fossil fuels: 1 TWh (1 million cubic meter) ordered
  - Complements other fuels with biomass in heat and power generation
  - Long-term storage possible

Sweden

- Shortage of biomass fuels demonstrated customers' appreciation of delivery reliability

Estonia

- Other fuels like energy peat were needed in Tallinn and Pärnu to back up biomass fuel supplies

Biomass fuels need back up fuels in transition to a low-carbon society

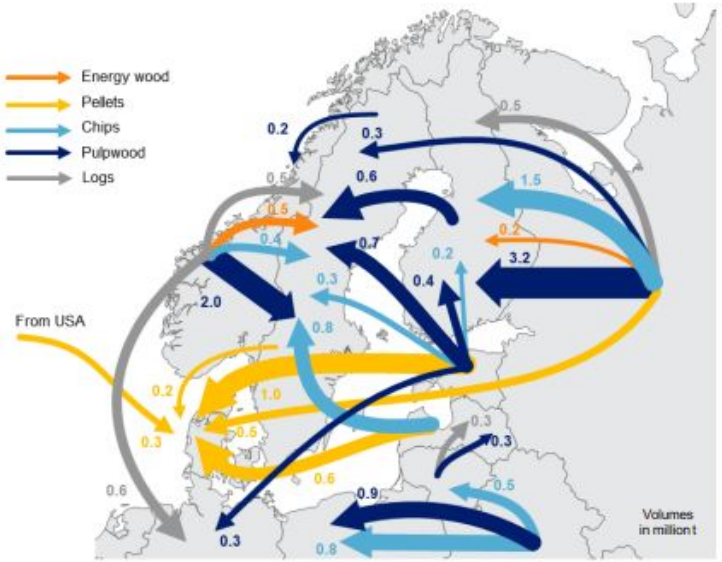
Big and growing wood fuels demand – more and more competition

North Europe biomass streams (by Pöyry)

BIOMASS TRADE FLOWS AT THE BALTIC SEA

Russia, Baltics and Norway are the main sources of origin for traded wood, Sweden and Finland being the main destinations for industrial wood and Denmark for wood pellets

- Pulpwood is the main biomass assortment traded at the Baltic Sea, mainly from Russia to Finland and from Norway to Sweden.
- Wood chips are also traded, mainly from Russia to Finland and from Latvia to Sweden. Most of the chips traded at the Baltic Sea consist of pulp chips, and the share of energy chips is still small.
- Denmark is the main destination for wood pellets originating mainly from Estonia, Latvia and Russia. The trade of other energy wood assortments is small compared to pellets.
- During the recent years, increased export from from Norway to Sweden has replaced imports from the Baltics, especially Latvia.



Peat industry globally uses 0.1% of the peatland area: Production of energy peat and peat for growing media used to be 50-50

Energy peat area in Europe more and more available for GM raw material production

VAPO / KEKKILÄ BVB HAS STUDIED ENERGY PEAT SUITABILITY IN GM PRODUCTION WITH GOOD RESULTS

Current energy peat production sites can provide peat for GM industry millions of cubic meters in annual basis from now on and especially during 2020's.

Vapo Group has conducted a study where peat samples were picked from Finland, Sweden and Estonia. Results show that energy peat productions sites differ from each others when it comes to suitability to use peat in GM but in general there is a lot of good production potential as soil improver and in horticultural and GM production purposes.

If interested Vapo Group's possibilities to supply peat for your GM, please turn to Mr Ari Huunonen!

Thank you for your interest!