

Carbon-free generation: Potential with SMRs in Finland

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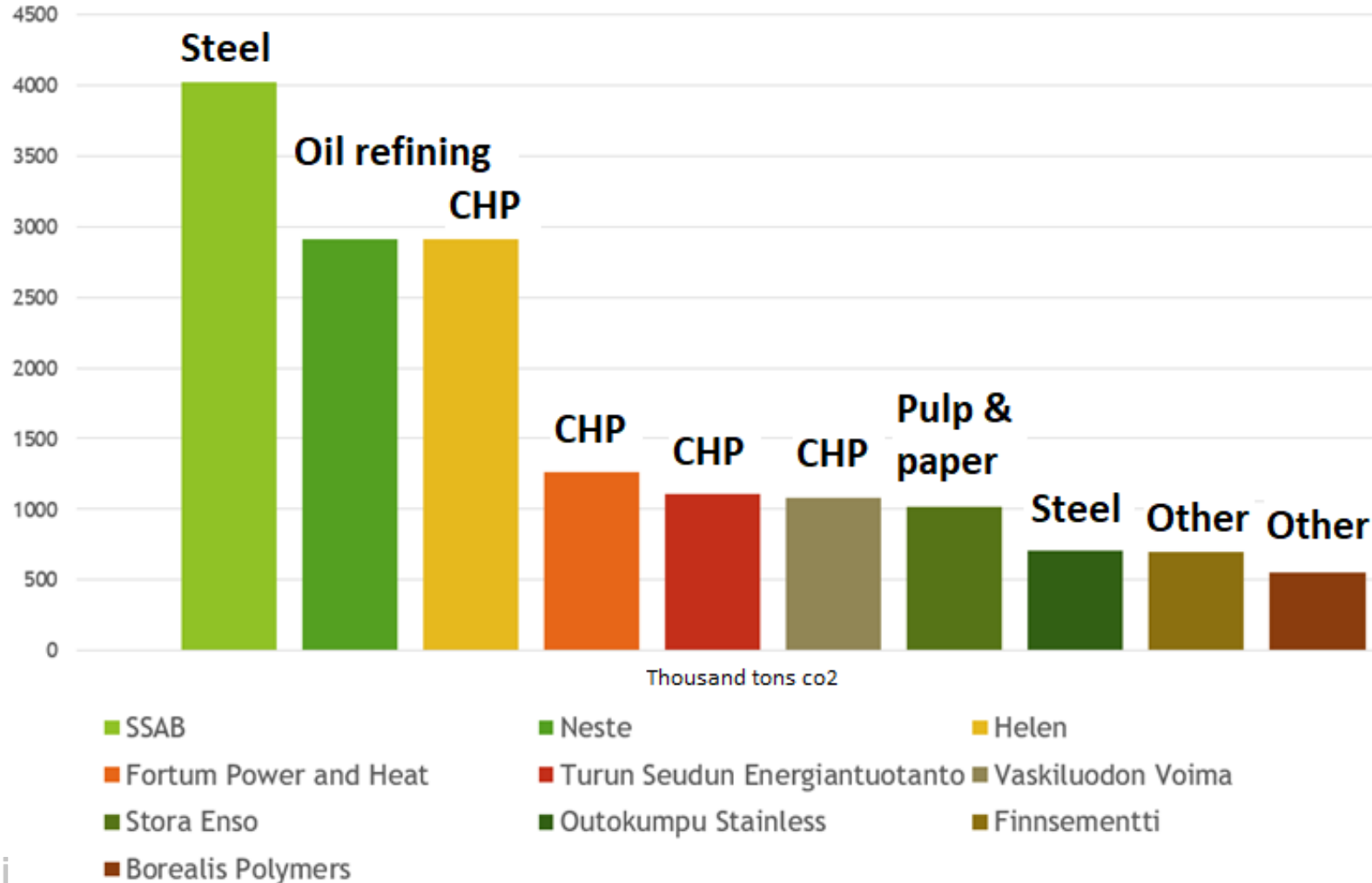


Energy is not just electricity

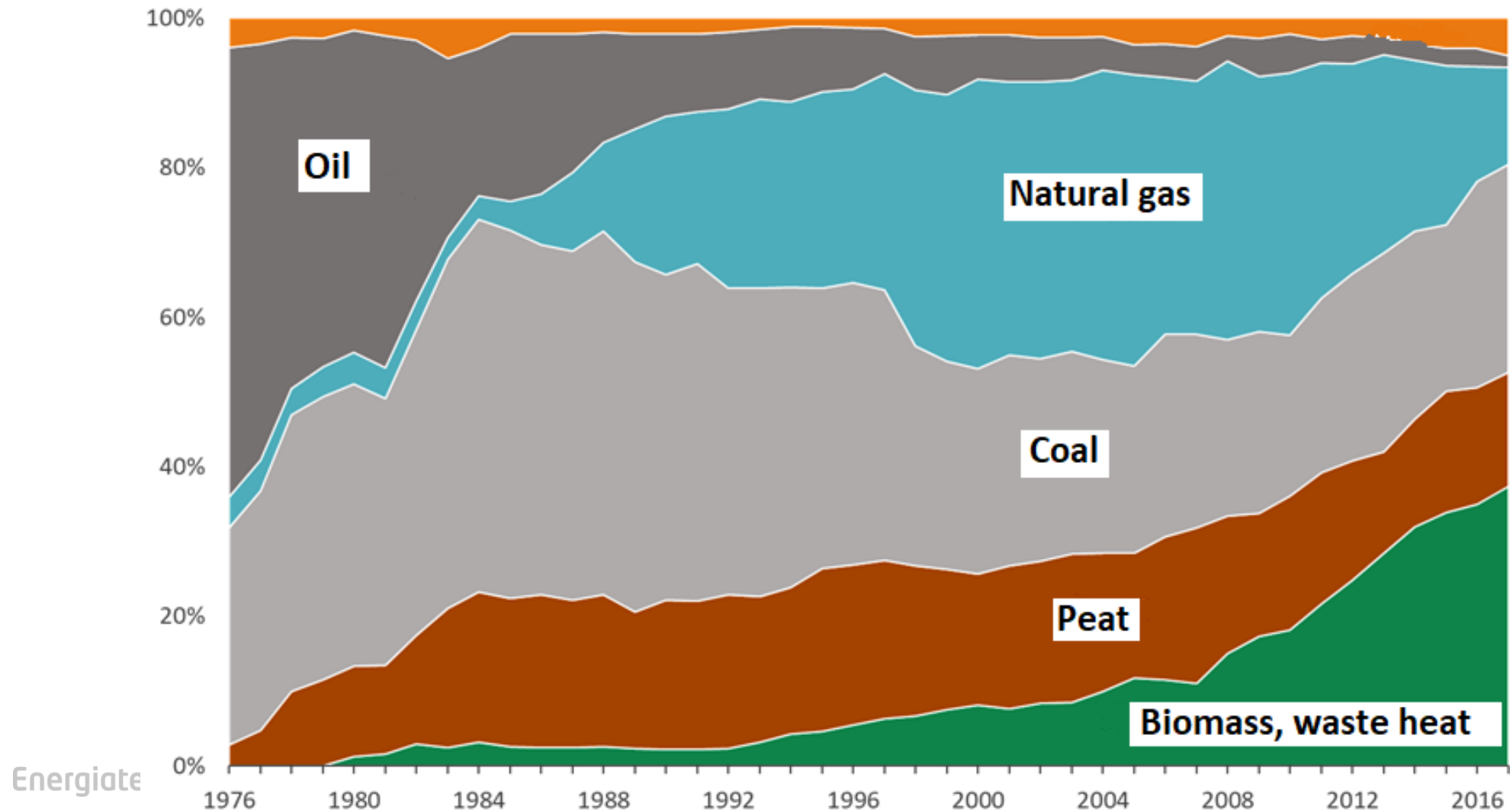


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Biggest co2 –emitters in Finland



District heating has a 66% market share in Finland and is increasing



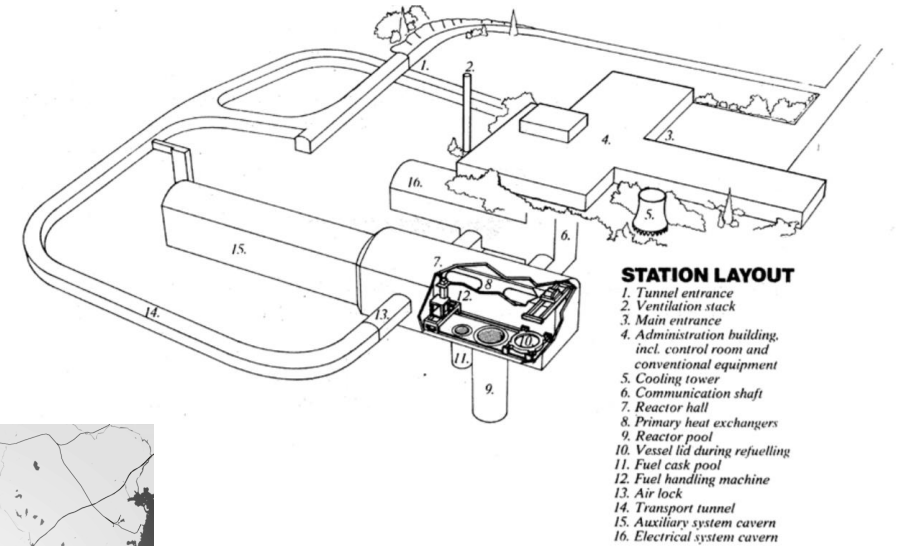
Prospects for nuclear heat utilisation



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Previous ideas on utilising heat from nuclear power plants

- In the 1980's, there was a Swedish-Finnish project to construct a heat-only NPP in Helsinki area (SECURE reactor)
 - Timing was unfortunate (1986)
- In 2010, Fortum applied for a decision-in-principle for Loviisa 3 NPP
 - There were plans to build a heat transfer pipeline to Helsinki area from the plant
 - Unfortunately, Loviisa 3 didn't get the decision-in-principle



A shift is happening in the green party

- “We haven’t opposed nuclear for a long time just for ideological reasons”
- Still not a fan of large-scale projects, but approves running plants
- Numerous greens have made initiatives for studying the potential of SMRs in the climate struggle
- Helsinki city council vote in June:

				Kousa Tiina (Vhr.)					
Månsson Björn (SFP)	Koskisen Kauko (Kok.)	Bogomoloff Harry (Kok.)	Rautava Risto (Kok.)	Kivellä Otsa (Vhr.)	Soinivaara Osmo (Vhr.)	Sinnemäki Anni (Vhr.)	Heinäluoma Eveliina (SDP)	Taipale Ilkka (SDP)	Vuorjoki Anna (Vas.)
Donner Jörn (SFP)	Urho Ulla-Marja (Kok.)	Hakola Juha (Kok.)	Vapaavuori Jan (Kok.)	Kari Emma (Vhr.)	Holopainen Mari (Vhr.)	Saarens Paulina (Vhr.)	Haatainen Tuula (SDP)	Heinäluoma Eero (SDP)	Arhinmäki Paavo (Vas.)
Baudet Eva (SFP)	Pelkonen Jaana (Kok.)	Asko-Sejvaara Sirpa (Kok.)	Kahtuvaa Arja (Kok.)	Rautakainen Mika (PerusS)	Chydenius Jussi (Vhr.)	Stranius Leo (Vhr.)	Wallgren Thomas (SDP)	Taipale Kaarin (SDP)	Puhakka Sirpa (Vas.)
Rantala Marcus (SFP)	Klemetti Tapio (Kok.)	Muutinen Seija (Kok.)	Koulumies Terhi (Kok.)	Hala-aho Jussi (PerusS)	Hamid Jasmin (Vhr.)	Vesikansa Sanna (Vhr.)	Lövén Jape (SDP)	Jalovaara Ville (SDP)	Honkasalo Veronika (Vas.)
Borgarsdóttir Sandeiri Sija (SFP)	Vartiainen Juhana (Kok.)	Rydman Wille (Kok.)	Peltokorpi Terhi (Kesk.)	Rantanen Mari (PerusS)	Juva Kati (Vhr.)	Oskala Hannu (Vhr.)	Vareikka Mirka (SDP)	Järvinen Jukka (SDP)	Kovulaakso Dan (Vas.)
Laaksonen Heimo (Kok.)	Kaleva Atte (Kok.)	Häkkinen Joel (Kok.)	Puska Pekka (Kesk.)	Kopra Pia (PerusS)	Yanar Ozan (Vhr.)	Ohisalo Maria (Vhr.)	Vepsälä Sinikka (SDP)	Mohamed Abdrahman (SDP)	Muttialainen Sami (Vas.)
Nygård Mia (Kok.)	Pajunen Jenni (Kok.)	Sazonov Daniel (Kok.)	Ebeling Mika (KD)	Hytinen Nuutti (PerusS)	Alametsä Alviina (Vhr.)	Hemberg Kaisa (Vhr.)	Vanhainen Reetta (Vhr.)	Abdulla Zahra (Vas.)	Said Ahmed Suldaan (Vas.)
Perpala Matti (Kok.)	Meri Otto (Kok.)	Saxberg Mirja (Kok.)	Venemies Mauri (KD)	Strandén Juhani (PerusS)	Tamminen Lija (Vhr.)	Harjanne Atte (Vhr.)	Sivo Satu (Vhr.)	Korkkula Vesa (Vas.)	Malin Petra (Vas.)
Niskanen Dani (Kok.)	Apter Ted (Kok.)	Pennanen Petrus (PIR)	Aro Katju (FP)						



Main challenges



Challenges that can be overcome:

- What is the technical availability of SMRs
 - 2020s
- Nuclear legislation needs to be updated to better enable SMRs
 - Work with the ministry is about to start
- How to prove to the regulator that the design is safe & can be located near population centers
 - Can be proven (design specific)
- How to overcome the risk of country-specific design changes to a given SMR design
 - A global or European regulator is difficult to achieve, but co-operation can be increased between regulators
- At what point can we reduce the FOAK risk to a reasonable level
 - Question is of timing. The sooner you want it, the higher the risk&cost

Challenges more difficult to overcome:

- **What is the cost / MWh**
 - This will largely determine whether there will be a market or not.
Depends on licencing, timing, chosen design, whether one wants a CHP or heat-only reactor, how much decarbonisation is needed
- How to overcome the **NIMBY** problem in densely-populated (large district heat networks) areas
 - Nuclear will always have opponents, even though the problem is less severe than before.
 - However, if the local municipality/city residents oppose the project, it's politically difficult to overcome
 - Mainly a political & communications challenge

Thank you!



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