## ENERGY CONSUMPTION IN FINLAND 2010 & SUSTAINABLE INCREASE POTENTIALS 2020

**Table 1. Total energy consumption & electricity supply by energy source 2010 in Finland. Sustainable increase potentials by 2020**

| **Energy source** | **Energy TWh (%)** | **[1] Electricity TWh (%)** | **+[2],TWh 2020** | **Remarks** |
|---|---|---|---|---|
| Oil | 98,1 (24,1) | 0,4 (0,5) | 0 | 50% in traffic use |
| Coal | 52,4 (12,9) | 13,6 (15) | 0 | Yearly variation in quantities |
| Natural Gas | 41,3 (10,2) | 11 (13) | 0 | +20 TWh/a possible |
| **Fossils Total** | **191,8 (47,2)** | **25,0 (28,5)** | **0** | Target is to decrease the use |
| **Nuclear Power** | **66,3 (16,3)** | **21,9 (25)** | **38,4** | New reactors in 2010's and 2020's |
| **Peat** | **26,3 (6,5)** | **5,9 (7)** | **0** | Difficult to get permits |
| Hydropower | 12,7 (3,1) | 12,7 (15) | 1,4 | Efficiency measures |
| Wind Energy | 0,3 (0,1) | 0,3 (0,3) | 6 | 10-12 TWh /a if subsidies |
| Solar Energy | 0,0 (0,0) | | 3 | Requires political steering |
| Heat Pumps: Ground heat and Air heat | 3,1 (0,8) | | 6,0 | Subsidies |
| Renewable (- bio), Total | 16,1 (4,0) | 13,0 (15,3) | 16,4 | In 2020 total ca. 32 TWh |
| Forest Energy<br>- Black liquor & others<br>- Wood fuels used in Industry and Energy prod.<br>- Small scale combustion | 88,8 (21,8)<br>37,7 (9,3)<br>32,3 (7,9)<br>18,9 (4,6) | 10 (11) | 11,0<br>0<br>11,0<br>0 | Increase wood chips use from $7*10^6$ m3 to 12,5 $*10^6$ m3 => ≈+11 TWh. Incl. pot. Biodiesel / wood gasification plants. |
| Biogas<br>- Waste: society and industry<br>- Agroculture: manure and energy crops<br>- Forestry: Wood gasification | 0,5 (0,1) | | 9,3<br>2,0<br>7,3 | Energy yield 4-fold to others Volume Estimates too optimistic?<br>8 TWh, incl. in forest energy |
| Other Bio-energy<br>- Recovered fuels, biodegradable part<br>- Liquid biofuels, Field biomass<br>- Mixed waste for combustion | 2,2 (0,6)<br>1,7 (0,4)<br>0,6 (0,1) | | 2<br><br><br>2 | Sorted at point of origin e.g. retail shop waste and demolition wood |
| Renewable energy, Bioenergy total | 91,5 (22,5) | 10 (11) | 22,3 | In 2020 ca. 114 TWh |
| **Renewable Energy Total** | **107,6 (26,5)** | **23,0 (26,3)** | **38,7** | **In 2020 ca. 146 TWh** |
| Reaction heat of industry | 2,0 (0,5) | | 1,0 | Possibly realizable |
| Hydrogen | 0,3 (0,1) | | 0,0 | As traffic fuel earliest 2030 |
| Recovered fuels sorted at point of origin | 1,2 (0,3) | | 0 | Includes demolition wood |
| Waste fuels; Combusted mixed waste, Rubber, Plastic, Hazardous waste | 0,5 (0,1) | | 1 | Increase due to combustion of mixed waste |
| **Other Energy Total** | **4,1 (1,0)** | **1,5 (2)** | **2** | |
| **Net Import of Electricity** | **10,5 (2,6)** | **10,5 (12)** | **0** | Intention to be self-sufficient |
| **Energy /Electricity Total** | **406,6 (100)** | **87,7 (100)** | | |
| **Increase potential Total** | | | **79,1** | **2020 non--foss. ca. 333 TWh** |

[1]Electricity supply by energy source. E.g. Share of electricity produced from peat was 5.9 TWh (7 % of electricity consumption)
[2] + = Sustainable energy increase potential by 2020. For nuclear energy increases will be done in 2010's and 2020's. Losses taken into account

Efficiency of nuclear power is ca. 33% (66 TWH => 22 TWh, 2010). Calculated in the losses. See. Table 2. Total energy consumption and end use of electricity by sectors in Finland 2010 / TWh

Awecore Oy / Koivurinteentie 115 / FIN-03300 Otalampi / tel +358 9 222 4466 / +358 400 700 142 / fax +358-9-222 4442
e-mail: info@awecore.com / www.awecore.com

**Table 2. Total energy consumption and end use of electricity by sectors in Finland 2010 / TWh**

| Source of energy consumption | Energy TWh (%) | Electricity TWh (%) | Remarks |
|---|---|---|---|
| Industry | 143 (45) | 41,5 (47,3) | |
| Households | 70 (22) | 23,6 (27) | |
| Traffic | 57 (18) | 0,74 (0,8) | International air traffic included |
| Services and public sector | 36 (11) | 17,8 (20,3) | |
| Agriculture and Forestry sector | 10 (3) | 0,9 (1) | |
| Other consumption | 4 (1) | 0,35 (0,4) | According to the energy balance 2,6 TWh. Value corrected to fit in with national statistics |
| **End use Total** | **320 (100)** | **84,9 (96,8)** | |
| **Losses** (Production, conversion, distribution) | **87** | **2,77 (3,2)** | 100 TWh according to the energy balance. Value corrected to fit in with national statistics |
| **Energy / Electricity, Total** | **407** | **87,7 (100)** | |

Quantities of forest energy are dependent on the success of forest industry. Economic cycles do influence.

Energy demand in Finland has big seasonal variations. Demand in July 4000 MW, normal months 8000 MW and during hard frost periods 15000MW. Peaks have been levelled with imported electricity. What about the future?

**SOURCES**


**Table 1. Total energy consumption & electricity supply by energy source 2010 in Finland. Sustainable increase potentials by 2020**
Tilastokeskus Taulukko T01_101, 1.3, Energian kokonaiskulutus energialähteittäin (TJ)
Tilastokeskus: Energiatilasto vuosikirja 2011
Keskustelu Öljyalan keskusliiton edustajan kanssa 4.5.2012. Öljy
Pitkän aikavälin ilmasto- ja energiastrategia. Valtioneuvoston selonteko eduskunnalle 6.11.2008. Hiili, maakaasu, reaktiolämpö
Gasum Oy, Jani Arala, Esitysmateriaali 25.4.2012. Biokaasu
Gasum Oy, Ossi Savolainen, 7.5.2012. Maakaasu
TEM, Bettina Lemström 24.5.2012. Ydinvoima
Tutkimusraportti: Energia ja ympäristöturpeen kysyntä ja tarjonta vuoteen 2020 mennessä, Flyktman, Martti, VTT
http://www.tem.fi/files/18671/min_Pekkarinen_Kapasiteettikuvat_270208.pdf. Vesivoiman lisäys
Tuulivoimayhdistys, Anni Mikkonen, 4.5.2012. Tuulivoima
Sulpu ry, Jussi Hirvonen, 4.5.2012, Tilastot ja visiot. Lämpöpumput
http://www.erec.org/fileadmin/erec_docs/Documents/Publications/EREC-roadmap-V4_final.pdf Mapping Renewable Energy Pathways towards 2020, EU ROADMAP, European Renewable Energy Council
Finland 2020: Photovoltaic 2241 GWh, , Heating&cooling 142 ktoe = 1651 GWh = 1,65 TWh
Kaisa Pirkola, Maa- ja Metsätalousministeriö, luento 12.4.2012 Metsäenergian lisäyspotentiaali
http://www.tem.fi/files/26643/UE_lo_velvoitepaketti_Kesaranta_200410.pdf Kohti vähäpäästöistä Suomea Uusiutuvan energian velvoitepaketti, Elinkeinoministeri Mauri Pekkarinen 20.4.2010. Metsäenergian lisäyspotentiaali
Keskustelu Motivan asiantuntijan kanssa, 7.5.2012, Reaktiolämpö
Nils-Olof Nylund 8.5.2012, Vety
L&T, Hietanen, Lassi, 7.5.2012. Kierrätyspolttoaineet

**Table 2. Total energy consumption and end use of electricity by sectors in Finland 2010 / TWh**
Tilastokeskus tase_2010_linkiton.xls, Energiatase vuonna 2010 (TJ)
Tilastokeskus Taulukko T01_10l, .1, 1.8.1 ja 1.8.2 Energian loppukäyttö sektoreittain 2010, TJ
Tilastokeskus: Energiatilasto vuosikirja 2011
Emeritus Professori Matti Kärkkäisen luento 22.4.2012. Metsäenergian riippuvuus puunjalostusteollisuudesta
L&T, Hietanen, Lassi, 7.5.2012. Energiatarpeen tyydyttäminen kulutushuippujen aikana