

## 1. EXECUTIVE SUMMARY AND KEY RECOMMENDATIONS

### EXECUTIVE SUMMARY

---

Finland's economy is highly industrialised, with sizeable high-tech manufacturing, electronics and chemical sectors operating alongside a significant forestry and paper industry. Yet with over one-third of the country located above the Arctic Circle, Finland is a largely rural and sparsely populated country, except for its southern tip. With its energy-intensive industries and its cold climate, Finland's energy consumption per capita is the highest in the International Energy Agency (IEA).

Finland is poorly endowed with indigenous hydrocarbon energy resources, thus placing energy policy, and particularly energy security, at the heart of the government's policy concerns. Finland notably leads all IEA member countries in terms of research and development funding for its energy sector. The focal points of the government's energy strategy are to strengthen its energy security, to move progressively towards a decarbonised economy, and to deepen its integration in the wider European market.

### CONSOLIDATING ITS ENERGY SECURITY

Finland is highly dependent on imported fossil fuels – namely oil, gas and coal – and will remain so in the long term. This poses a significant challenge in terms of energy security. The government has taken significant steps to address this concern.

As a first line of defence, Finland has sought to bolster its emergency response capabilities by building significant strategic reserves. According to the 1992 Act on Security of Supply, Finland's public stockholding agency, the National Emergency Supply Agency (NESA), must ensure that the country holds alternative fuels for oil and gas disruptions that match at least five months of consumption. Notably, this stockholding requirement is above the IEA oil stocks requirement of 90 days of net imports for all member countries.

A second line of defence is diversification. Finland has succeeded in developing a particularly well-diversified national electricity production mix, with roughly three equal thirds of its production coming from renewable, nuclear and hydrocarbon energies respectively. Its energy resilience has been further consolidated through deepened integration in the wider Nordic electricity market that notably includes its hydro-endowed Scandinavian neighbours. In 2012, the entire Nordic area had one common electricity price during 31% of the time, up from 25% in 2011 and 18% in 2010.

Another way to avoid dependence on energy imports is to reduce domestic demand, and Finland has been resourceful in initiating and implementing significant energy efficiency programmes. Finland's 2008 Climate and Energy Strategy sets as an overarching goal to reverse growth in final energy consumption, and an additional ambitious target to save approximately 11% of total final consumption by 2020 compared to the business-as-usual scenario. Given Finland's climate, building codes have been revised and subsidies to enhance the efficiency of existing building stock have been introduced. Efforts are also

planned in the transport sector, with the introduction of new private-vehicle technology and speeding up the renewal of the existing car stock by 2020. Yet its transport sector remains highly oil-dependent. Developing further efficiency innovations in the transport sector would enable Finland to reduce its exposure to imported hydrocarbons.

An inevitable characteristic of Finland's energy consumption structure is the high share of energy-intensive industry, as well as a long lighting and heating season. Yet the country has turned these vulnerabilities into strengths by developing one of the world's most extensive and efficient combined heat and power (CHP) industries and district heating networks. CHP accounts for over a third of total electricity production, well above the European Union (EU) average of 10%, and district heating provides almost half of the country's space heating.

Finally, Finland has sought to maintain what alternative, indigenous forms of hydrocarbon energy it possesses. It is one of only three IEA member countries with peat in its energy supply, and its use is a topic of much public debate because of its high-carbon intensity and negative environmental impact. Nonetheless, peat use accounts for 6% of total energy consumption, and about one million Finns have their homes and offices heated partly by peat-fired district heating systems. While subsidies have been abolished and the tax regime is increasingly burdensome for its longer-term use, peat nevertheless continues to benefit from a comparatively preferential tax regime because of its unique technical qualities in CHP co-firing with biomass, security supply benefits, widespread availability, price stability and its contribution to regional economic development. Nevertheless, because of its high emissions profile, the outlook for peat in Finland's future energy mix remains undecided and is a source of uncertainty.

While each of these elements contributes to ensuring the country's energy security, the government's principal long-term goal in terms of energy security is clearly intertwined with another key pillar of its energy policy – the “decarbonisation” of its economy, notably by developing cleaner means of energy production and consumption.

## PUSHING FOR PROGRESSIVE DECARBONISATION

Decarbonising the Finnish economy is a long-term objective, as is the case in other neighbouring Nordic countries. Finland has already one of the lowest shares of fossil fuels in its energy mix among IEA member countries, ranking fourth-lowest in 2011 (behind Sweden, France and Switzerland), and leads all IEA member countries in terms of biofuels share in its energy mix.

The recent economic crisis and the resulting structural changes in the underlying economy have had a positive impact on Finland's emission profile. Notwithstanding this, Finland has adopted a range of policies that have contributed to this reduction, including in those sectors which fall outside the European Union Emissions Trading Scheme, such as transport, domestic heating and agriculture. Finland is on track to meet its share of the ambitious, EU-wide greenhouse gas emissions reduction targets of 20% below 1990 levels for the 2013-20 period. Fiscal policy has also made a contribution: in 2011, the government modified the structure of energy taxes on fuel for transport and CHP plants, with the tax now being based on the energy content, carbon dioxide emissions and local particle emission levels that have adverse health effects. In terms of longer-term strategy, two cleaner sources have been prioritised – renewable energy and nuclear energy. Besides

the obvious benefits in terms of energy security, this two-pronged push to continue to develop renewable and nuclear energy has the additional advantage of decarbonising the economy and thereby meeting national climatic objectives.

Finland has a very ambitious renewables programme, with a view to meeting its binding EU target to increase the share of renewable energy to 38% of final energy consumption by 2020. Finland is the most forested country in Europe, with approximately 86% of the country covered with coniferous forests. The government has clearly indicated that forestry will play a central role in meeting its renewables target, with the sector having to contribute half of the additional 38 terawatt hours between 2005 and 2020. Measures implemented to attain the country's renewables target include promoting the use of forest chips and other wood-based energy, alongside wind power, the use of biofuels in transport, and the greater utilisation of heat pumps. Although the government is in favour of the requirement that biomass use be sustainable, there are serious concerns about potential EU schemes in this regard, which could bring about a great deal of administrative burden for their certification.

Finland has also developed a significant nuclear energy programme in order to contribute to diversifying its energy security and meet its low-carbon objectives. It is one of the few IEA European member countries with plans to expand its nuclear capacity. This success can be attributed to the government's effective and inclusive planning and consenting regime, and to the high level of trust that the population has in its government due to its top-of-the-league ranking in terms of transparency and absence of corruption. In 2010, in accordance with its Climate and Energy Strategy, the Finnish Parliament ratified favourable decisions-in-principle for two more nuclear power plants (in addition to Olkiluoto 3, which is already under construction). If all planned nuclear projects are completed, there will be seven nuclear plants in operation, bolstering the output share of electricity produced by nuclear from 28% in 2010 to over 30% in 2020 and potentially up to 60% in 2025. The government must ensure that lessons learned from the delays in the construction of Olkiluoto 3, now expected to enter commercial operation before 2016, are taken into account for new projects, so as to meet its 2020 and longer-term targets. Regulatory issues surrounding the availability of sufficient radioactive waste disposal facilities must also be addressed, if Finland's ambitious nuclear programme is to be successfully implemented.

## SUPPORTING REGIONAL INTEGRATION

Though somewhat isolated from the larger European continent, Finland's energy policies are well integrated with those of the European Union. Its energy targets are aligned with the Union's growing energy policy framework, and generally comply with EU legislation, particularly relating to the European Union's binding 2020 targets and to the third package for an internal EU gas and electricity market. The third package was adopted in 2009 with a view to ensuring the proper functioning of energy markets and enhancing cross-border trade and access to diversified sources of energy. At the heart of this legislation is the European Union's intention of ensuring and consolidating ownership unbundling, including new rules on network ownership and operation, rules strengthening the independence and the powers of national regulators and rules on the improvement of the functioning of retail markets to the benefit of consumers.

On the whole, Finland's electricity market has been largely liberalised, and it is well integrated within the competitive Nordic market, Nord Pool. Nonetheless, the European

Union has raised concerns regarding Finland's electricity market primarily relating to the lack of certification of the transmission system operator, Fingrid, and to the specific role and duties of the regulator.

In the gas market, however, Finland's present market arrangements stand in clear contradiction with the EU vision. Owing to the country's particular circumstances, Finland had received a derogation from the European Union's internal energy market rules regarding the opening of its market and opted for "regulated network access". This derogation applies as long as there are no direct connections to the gas network of any other EU member state and as long as Finland has only one natural gas supplier. At present, the gas market remains severely constrained by its undiversified import sources (one pipeline entry point from Russia) and the lack of supply infrastructure, while its sole importer, Gasum, both owns and operates the pipeline network. Nonetheless, Finland is exploring alternative supply routes.

Finland co-operates with other EU member states and regional neighbours in the context of the Baltic Energy Market Interconnection Plan (BEMIP), whose stated objective is to examine measures for improving energy interconnections between countries on the Baltic rim and thereby extending links within a wider EU energy network. Projects under consideration include a "Balticconnector" natural gas pipeline between Finland and Estonia and a liquefied natural gas terminal shared between Finland and the Baltic countries. Integration with the Baltic states would notably allow Finland to compensate for the absence of gas storage facilities by linking it to significant gas storage facilities in Latvia. The more diversified supply options associated with greater regional integration can provide significant energy security benefits for Finland. Accordingly, Finland must take decisive steps to amend its gas market structure and ensure its compliance with EU directives, so as to push forward with these regional opportunities.

## KEY RECOMMENDATIONS

*The government of Finland should:*

- Continue to address energy security concerns in a comprehensive and sustainable manner, while pursuing its focus on its key policy pillars of bioenergy and nuclear energy.*
- Maintain its drive to improve energy efficiency, notably through a stronger focus on efficiencies in the transport sector.*
- Actively contribute to finding a mutually acceptable solution at an EU level regarding the discussion on sustainability criteria for biomass and the development of a robust certification scheme that does not create an unacceptable burden for small forest owners.*
- Seek to develop the regional integration of its gas market, building on the example of its successful regional integration in electricity markets.*