Innovative finance solutions to accelerate sustainability transitions

Scoping study on the potential role of Energy Transition Impact Bonds (ETIB) to address rapidly increasing wind power employment needs

March 2022

Summary

This scoping report discusses the feasibility of the impact bond approach in tackling labor shortages in wind power development in Finland, at a moment in early 2022 when ambitious climate neutrality targets are being accompanied by increasing national and international discussions on how to best secure sustainable energy provision.

Based on literature review, as well as stakeholder consultations in Finland, including discussions conducted as part of "Developing Finland's Sustainable Finance Ecosystems"- project and in particular within its pilot ecosystem focusing on offshore wind power, **the issue of labor shortages has been identified as one of the relevant bottlenecks preventing rapid scaling of wind power investments in Finland.**

As the project is looking for financing solutions to key sustainable transitions in Finland, impact bonds (IB) have been recognized as a potential solution to address the bottleneck at required scale and pace. The benefits of an impact bond would come among other from an increase in the degree of domestication of the planning, construction and maintenance of wind farms and hence resulting increase in employment related tax revenues and savings in unemployment benefits. This study provides an initial analysis of such benefits, while noting that several stakeholders have also highlighted other potential benefits from scaling up Finnish wind power investments. Stakeholders have highlighted potential business development and competitiveness benefits for Finnish wind power solutions on a rapidly growing international market but, the analysis of such sector/national wide benefits is outside the scope of this study.

According to wind power experts the lack of suitable work force is already hampering sector development and measures to address this bottleneck should be launched rapidly.

To date, 11 social impact bond (SIB)-projects have been implemented in Finland and they have performed well, for example an employment-related impact bond, the "Koto-SIB", has clearly outperformed traditional employment measures. Impact bonds are especially effective solving complex problems requiring fast, tailored, and innovative approaches. Hence their potential for reducing labor shortages in wind power industry should a priori be of interest.

If current wind power capacity need forecasts materialize, up to 10,600 new direct jobs are expected to be created by 2030, naturally depending on share of domestic workforce (versus international workforce). The total cumulative new full time employment years 2021–2030 is estimated at 41 500 - 77 000 and corresponding cumulative **income tax revenues 430 – 620 M€,** as noted above, **depending heavily on degree of domesticity** in planning, operating and maintenance. In addition, the property tax revenue increase can be estimated to 400 M€. Property tax revenues depend a priori on timelines, i.e. if wind farms can be built on schedule, but are not dependent on whether they are built with domestic or foreign labor.

If we assume that all the 10,600 employees needed for the new jobs should be trained from scratch in Finnish vocational schools and universities, the cost would amount to approximately 250 M€. It is important to note that retraining is likely to provide a faster and cheaper way to respond to labor shortages than training from scratch.

An impact bond helping to finance required investments in skilled employment capacities (Energy Transition Impact Bond, hereinafter referred to as ETIB in this report), could contribute considerably in tackling labor shortages. If well planned and implemented, it could also help take into account the fairness aspects of the green transition, while securing that the public sector gets more tax revenues than it pays

out. To get the most of such an ETIB, noting then ambitious climate neutrality target of Finland, it should be launched as soon as possible.

This study outlines a potential solution for financing the required research, capacity and skills development through the launch of an impact bond, i.e. an Energy Transition Impact Bond, (EITB). It suggests as next required steps to conduct a more detailed feasibility study including more elaborated cost and benefit analysis as well as an analysis of optimal commissioner for such an impact bond.

This pre-study has been prepared in connection to "Developing Finland´s Sustainable Finance Ecosystems" – project, identifying a number of recommendations to improve the Finnish finance landscape. The pre-study has been produced by Petri Hilli (QSA Quantitative Solvency Analysts Oy), with funding from the Ministry of Economic Affairs and Employment. Mikko Halonen and Anu Vaahtera (Gaia Consulting Oy) have provided review comments to this work, which was conducted in late 2021 and early 2022.

1. Introduction and the impact bond landscape in Finland

Setting the scene and terminology

According to the UK Government Outcomes Lab, impact bonds (IBs) are outcomes-based contracts. They use private funding from investors to cover the upfront capital required for a provider to set up and deliver a service. The service is designed to achieve measurable outcomes specified by the commissioner. The investor is repaid based on achieved outcomes. IBs differ from traditional contracts by focusing on the outcomes, rather than the inputs and activities. Impact bonds are differentiated from other forms of outcomes-based contract by the explicit involvement of third-party investors. (Golab 2022)

Impact bonds have usually been named according to their key objectives, with SIBs (Social Impact Bonds) focusing on the prevention of social problems and EIBs (Environmental Impact Bonds) on environmental challenges. Thematic naming is also used, for example, the education-SIBs focus on improving learning outcomes. In energy transitions, both SIB and EIB can be considered justified. In this case, with the funding solution is aiming to accelerate expertise, skills and capacity development, in order to enable the energy transition to happen at required scale and pace, the term and abbreviation **ETIB** (Energy Transition Impact Bond) is used.

The impact bond landscape in Finland

Although the number of SIBs in Europe is growing and European Investment Bank is supporting the growth through the European Investment Advisory Hub, the markets in different countries are at different stages of maturity. The Finnish impact bond market is sufficiently developed to be exploited fast to tackle social and/or environmental challenges in a rapidly changing environment.

To date SIBs have been used to scale up outcome contracting especially from a proactive and preventive point of view. The first SIB, Tyhy-SIB focusing on occupational wellbeing, was launched in Finland already in 2015 and ended 2020. The second, Koto-SIB focusing on employment of immigrants, was implemented 2017-2019 and its evaluation period ends 2022. An employment SIB is running until 2025 and Children SIB I and Children SIB II are running until 2031. Children SIB I and II are funds including several commissioners (municipalities) and every commissioner has a unique SIB-contract tailored specific needs of that commissioner.

At least EUR 30 million of investment money has been / will be raised for ongoing and completed SIB-projects[1] (excluding Children SIB II, for which estimate is not yet available) in Finland. So far, obtaining investment money has not been an obstacle to starting SIB-projects in Finland.

Several SIB- and EIB -projects are also under construction, with an up-to-date list to be found on the website of the Centre of Expertise for Impact Investing, https://tem.fi/en/sib-projects. From the point of the public sector, impact bonds are especially useful in solving complex challenges requiring fast, tailored and/or innovative approaches and where outcomes should be visible within 2-7 years.

Figure 1 presents a typical structure of a Finnish impact bond. The Finnish IBs use always multiple complementary service providers to work together to achieve an impact. Because, in IB, only outcomes are purchased and measures to achieve outcomes are not predetermined in the procurement, it is possible to work in very flexible and innovative ways with complex issues. Only the fund manager must be selected

[1] https://tem.fi/en/sib-projects (reference Dec 16th 2021)

through a tender, but the fund can replace or supplement service providers during the contract period if it is considered to improve the performance. As the IB pays all the costs of service providers, and the IB gets back capital and return only from outcome-based payments, optimal incentive structures are rather easy to design over the whole chain where every actor's return is based on the achievement of outcomes, i.e., how effective the whole chain is, not based on a particular actor´s performance only. This serves as a clear incentive and directs service providers to collaborate, rather than optimizing their own part.

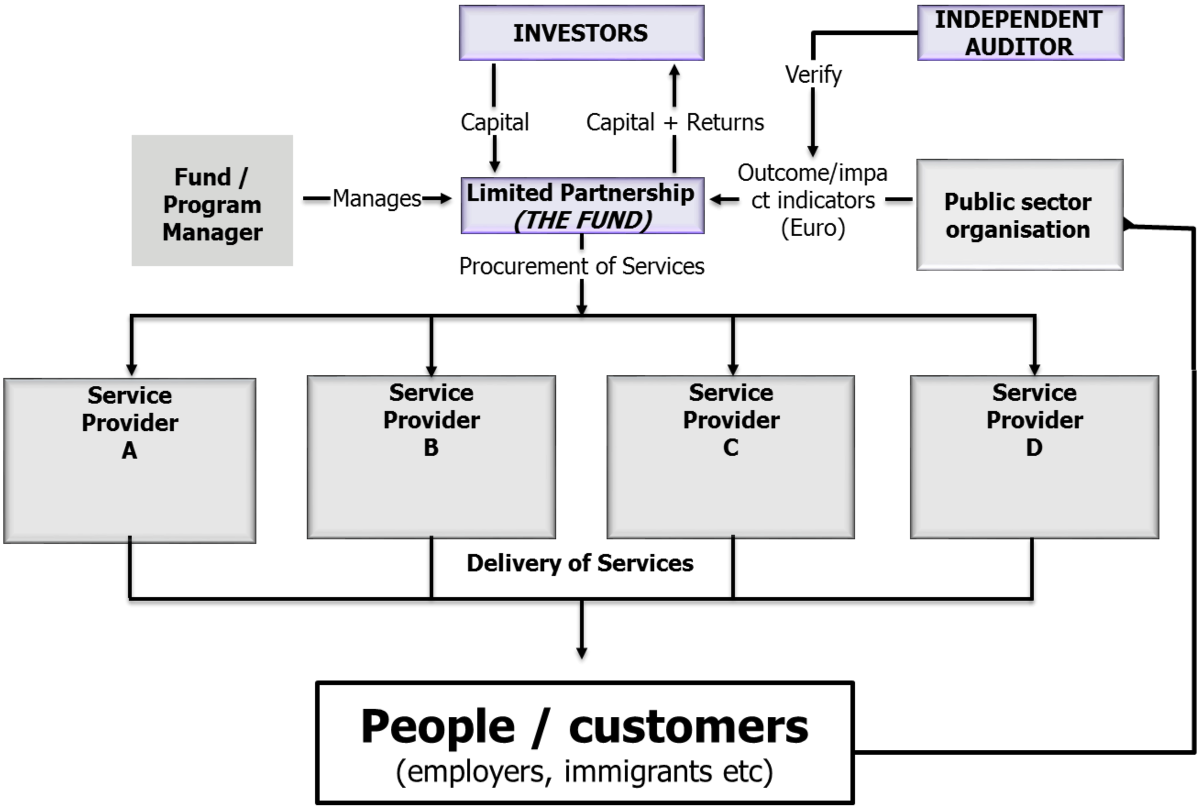

Figure 1: Structure of typical impact bond (source: The Finnish Innovation Fund Sitra)

2. Assessing the need for impact bonds

The need for an ETIB is based on expected shortage of workers. The expected shortage is difference of expected need for and expected number of workers 2022,…,2030. The expected number of workers is calculated

Expected number of workers (t) = initial workforce (t-1) + new graduates (t) – retired (t).

for each year *t* = 2021,…,2030. Expected number of workplaces depends on expected capacity which is calculated analogously

Expected capacity = initial capacity(t-1) + new capacity(t) – decommissioned capacity(t).

No decommissioning is expected during the period 2021 - 2030. The expected and new capacity is calculated based on MW, which are converted to planning, production and maintenance FTEs (Full Time Equivalent). For onshore wind power, the parameters are extracted from the report *Tuulivoiman aluetalousvaikutukset*

(Ramboll 2019) and *Renewable energy benefit* (IRENA 2017) and for the offshore wind power from the report *Socio-economic impact study of offshore wind* (Danish Shipping 2020). The onshore parameters are estimates from domestic and global data and offshore estimates from EU-data.

FTEs for planning and production for year *t* are calculated based on given parameters and expected new capacity at year *t*. FTEs for maintenance for year *t* are calculated based on accumulated capacity year *t*. The new capacity year *t* is not accumulated year *t* but year *t+1*, i.e., new capacity will not need maintenance during the construction years.

Direct FTEs are calculated because those are potential bottlenecks for wind power growth. The indirect FTEs are also important but as those are mainly traditional jobs, they are not considered as bottlenecks while local shortages may occur. However, as the parameters during this pre-study are estimated more on “top-level”, during subsequent, more detailed feasibility analysis, the exact needs for required know-how must be re-reviewed with the wind power actors to ensure that no essential skills needs are overlooked.

Wind power capacity forecasts are constantly evolving and need to be updated frequently enough.

Onshore labor demand

Figure 2 shows expected onshore capacity for 2021 – 2030 and Figure 3 corresponding direct FTEs. The report *Tuulivoiman aluetalousvaikutukset* (Ramboll 2019) excluded non-domestic employment effects. If non-domestic parts may form potential bottlenecks in the near future, and such elements in the wind power value chain could be transferred to Finland, those should be added also to FTE-estimates.

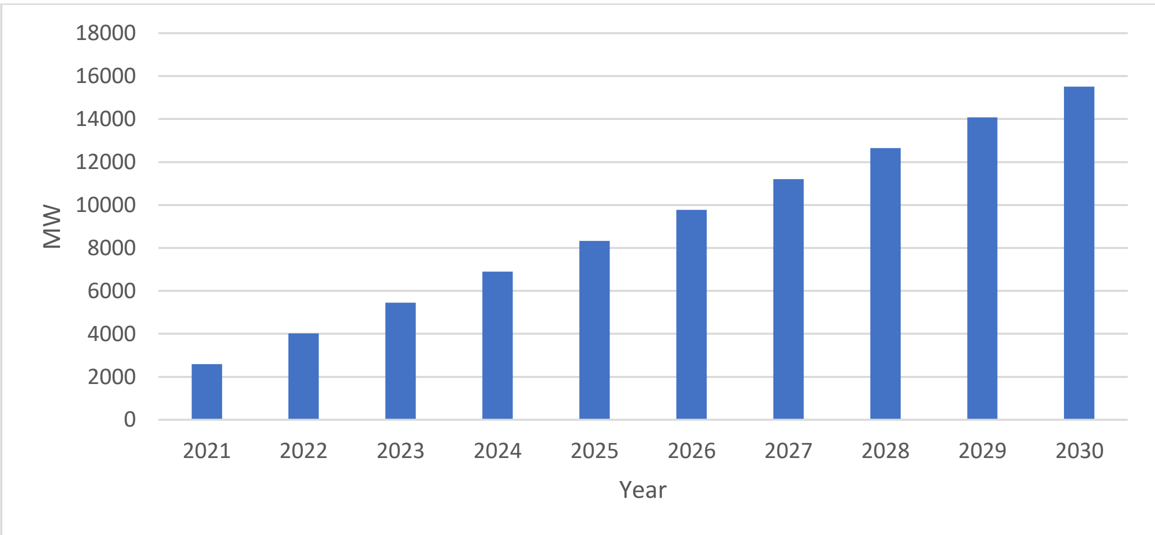

Figure 2: Expected onshore capacity

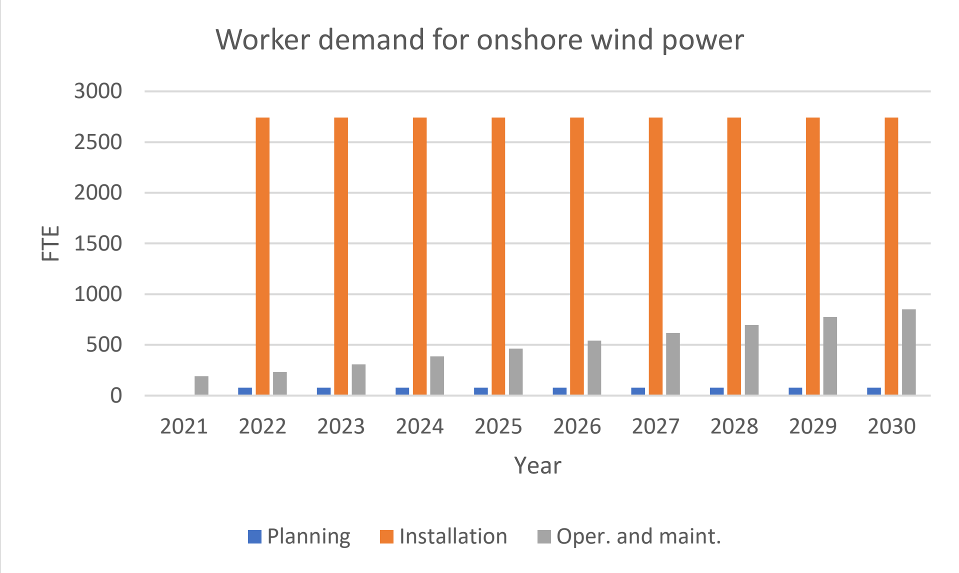

Figure 3: Expected labor demand for onshore wind power

Assuming that the current capacity (end of 2021) can be filled by the current workforce, oversupply of labor doesn't exists and construction capacity of current work force is 300 MW/year, reaching the targeted new onshore capacity (13 GW, Tuulivoimayhdistys 11/2021, projects passed the preliminary land using plan -phase) will require approximately 3000 new employees until 2030, see Table 1. It is good to note that, for example, some activities may already have labor that will be freed up from existing construction projects. Total new FTEs 2021 – 2030 is 30 000.

Phase	FTE
Planning	80
Construction	2000
Operations and maintenance	850
Total	3680

Table 1: Estimate of new workplaces and their types s, onshore

Offshore labor demand

Figure 4 shows expected offshore capacity for 2021 – 2030 and Figure 5 corresponding FTEs. The 10 GW capacity is evenly distributed over the years 2023 – 2030. According to the Finnish Wind Power Association, 2,8GW is currently in preparation. The report *Socio-economic impact study of offshore wind* (Danish Shipping et al. 2020) also reported FTEs related to the manufacturing of turbines, which has a significant employment impact. Those are currently not produced in Finland and hence, missing from offshore FTEs (approximately 3300 FTE).

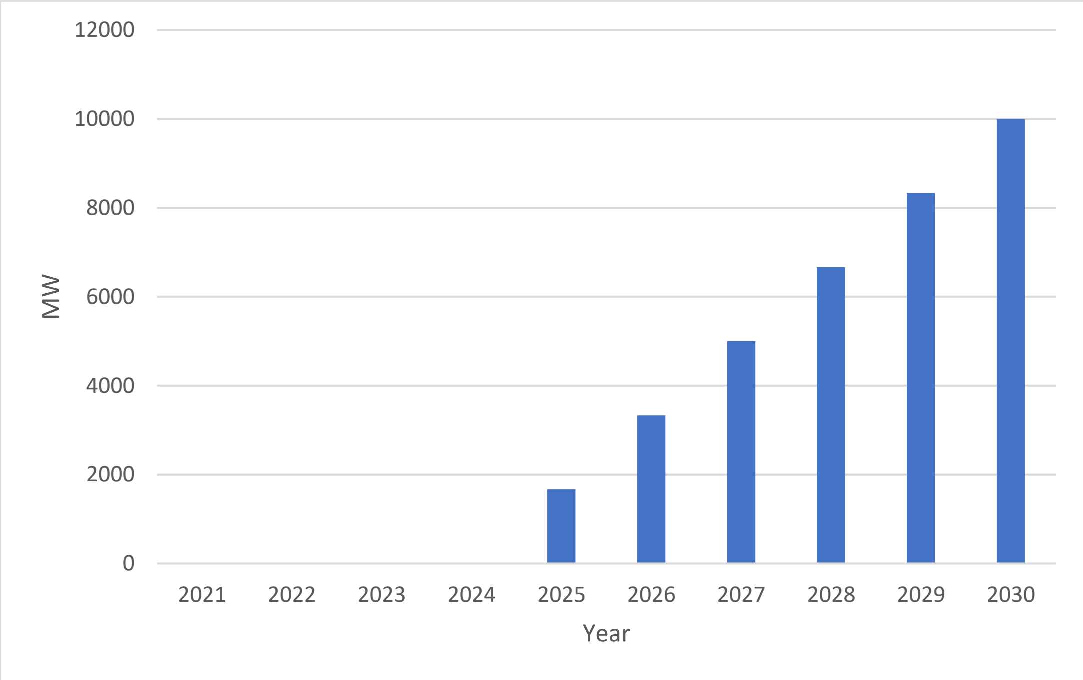

Figure 4: Expected offshore capacity

Assuming that the current capacity (2021) can be filled by the current workforce and that there is no oversupply of labor, new offshore capacity (10GW) will require 9253 new employees until 2030, see Table 2. It is good to note that, for example, some activities, for example in planning, may already have labor that will be freed up from existing construction projects. Total cumulative new FTEs 2021–2030 is 47 000.

Phase	FTE
Planning	950
Construction	6000
Operations and maintenance	700
Total	7650

Table 2: Estimate of new workplaces and their type, offshore

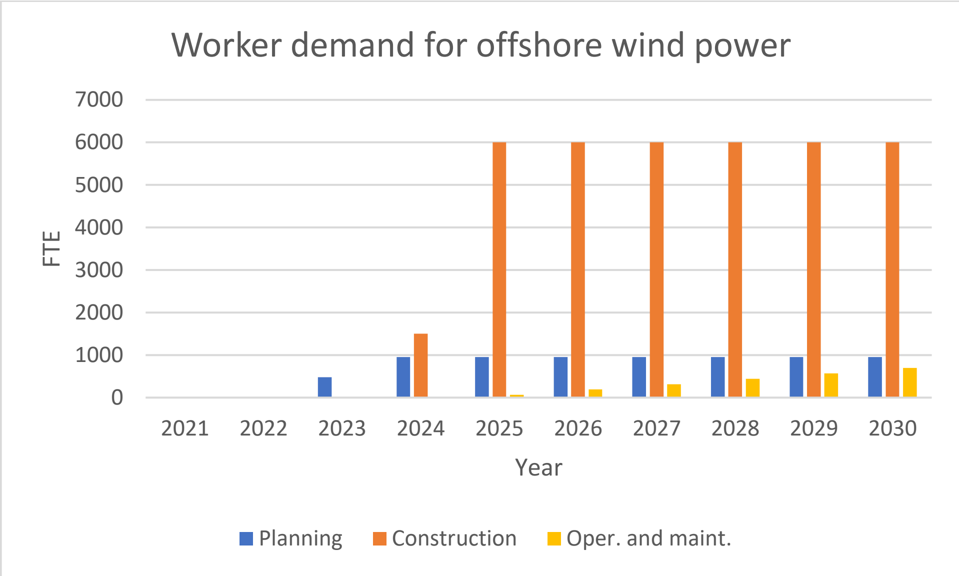

Figure 5: Expected labor demand for offshore wind power

Assessing the need for ETIB

If we assume, that all the employees to the new jobs (approx. 10 600 in 2030, onshore + offshore) should be trained from scratch in Finnish vocational schools and universities, that cost approximately 250 M€. In practice, experienced staff are also needed to take projects forward as well as retraining from other professions is needed. For example, KMPG argues that offshore wind sector can benefit from many synergies in occupational patterns shared with offshore oil and gas sector (KPMG 2019). Thus, training new young people in the field alone is not enough in the short term.

The actual need for labor is divided into many professions, biologists, geologist, engineer, etc. For example Ohrling et al (2021, p. 25) describe the changing skills needs in the wind power sector that should be considered in a more detailed assessment of the training needs of the workforce. The accurate need changes over time as new projects emerge, and this should be rather flexible to take into account in the ETIB's activities.

New employees are constantly being graduated from Finnish schools, but an estimate of wind power experts is not available. To estimate shortage, expected number of new graduates 2021-2030 is needed and should be found out before starting a tendering process (see chapter 2). However, employers are already reporting labor shortages, indicating that there are not enough workers available for scaling up wind power.

The key question is whether the labor shortage can be addressed by the public administration itself or whether additional resources are needed. Finland's education system is strong, but its ability to respond quickly and flexibly to changing demand may also need new approaches in financing and finding trainees. . Universities and vocational schools can operate as service providers in ETIB, like Hanken School of Economics was service provider in Koto-SIB. For example, the school's role could be the actual training, as other service providers focus on finding trainees and directing trainees to work and updating needed skills in the market. In this model, every service provider can focus on their core competencies and the whole chain is built to work seamlessly towards alleviating labor shortages.

ETIB doesn't suffer from such short-term inflexibilities because only outcomes are purchased and the process to achieve outcomes can be modified easily even during the contract period. ETIB can also remove restrictions not related to training/education, which is time consuming for traditional schools but can have a major impact on labor availability. Hence, ETIB seems to be a useful short- run (<7 years) tool to promote the growth of wind power in Finland, i.e. addressing one of the bottlenecks for upscaling.

3. Understanding the role and process of tendering

The ETIB-model involves the purchase of outcomes, and the project must be put out to tender. Compared to traditional tendering, the winner is not the one with the lowest production price but the one with the best euro/outcome-ratio.

A good starting point for an ETIB could be Koto-SIB. The aim of Koto-SIB was to find jobs for certain workers and to provide the necessary training from the initial state (existing education, own aspirations etc.) to employment. In this case thing turns the other way, i.e. ETIB has to find and train employees for jobs. However, both emphasize close cooperation with education/training and employers, and performance is rather easy to monitor. Koto-SIB is described in more detail in Appendix A.

It is advisable to prepare as much as possible before the formal process, to speed up the formal procurement process. The outcome to be purchased is the number of employees trained, with given the quality requirements. This requires an updated expected workforce need estimate, which should be as accurate as possible for the next five years. The whole production chain should be considered for all occupations, both direct and indirect labor needs, to determine specific needs as accurately as possible. Not only the profession, but also the required experience, locality, and so on. It is advisable to have preparatory discussion with the key actors before starting the formal tendering process. The tendering process lasts 4 - 6 months and training can usually start within a couple of months of the end of the tendering. As the trainings last 1-5 years, so it is worth starting the ETIB immediately.

Hansel Ltd has acted as a consultant in the tendering process for the previous three SIBs (Employment- Koto- and Children II -SIBs) in Finland. Children SIB I was tendered during the previous procurement law 2016 and KL-Kuntahankinnat Ltd acted as a consultant (KL-Kuntahankinnat merged with Hansel at the beginning of September 2019). The tender requires a procurement expert, a representative from the commissioner, a SIB expert and a wind power expert.

Payment mechanism

One of the key points in an IB-contract is the payment mechanism. It determines what outcomes will be obtained and how risky the contract is for different parties.

The simplest method of payment would be to pay a lump sum for each graduated / trained person. If this is seen too risky from the commissioner’s point of view (a degree/training alone does not guarantee employment in the field), the performance bonus can also be partially or in whole tied to working with wind power. The latter guarantees that workers are available for the industry, which is the goal of the ETIB.

Depending on the occupation and the starting situation of the person, training can take 1-5 years. Hence, payments will also be paid after 1-5 years. Government budget practices in outcome-contracting could be adopted from the Employment-SIB.

Service providers

Service providers can be any form of organization. However, before the formal tender, it would be a good idea to ensure that there are enough actors to deliver the required services successfully. In the previous SIBs, formal market dialogue has worked well. After dialogue (in practice consisting of a 2-4 hours event to present the case and interact with key stakeholders), actors have had time to network and negotiate for a few months and form an idea of what could be their own role in an ETIB and who are needed to build a “dream team” to deliver on the ETIB.

Other considerations

There is a shortage of workers in many industries in Finland and any ETIB should avoid transferring labor shortages from one sector to another. To avoid moving the shortage of labor from wind power to other fields, retraining / workers a priori from declining industries (peat production and other fossils etc.) and unemployed person should be preferred. This requirement/preference can be considered either in the payment mechanism or through adding harder restrictions to selection of persons to the ETIB-program. In payment mechanism, that would for example mean a higher premium for persons who come from declining industries or have been unemployed.

4. Initial impact estimates on employment related benefits

This pre-study provides an initial assessment of economic impacts that come through increased income taxes. Noting that wind power (onshore and offshore) can rather flexibly also in Finland be implemented through foreign labor, the level of Finnishness/ degree of domestication of the employees in offshore projects is a key variable in these estimations, as noted below.

Overall, a number of other costs and benefits are linked with wind power investments, and even if not addressed in this pre-study, they are noted in section below (Discussion on impact) and should be addressed in follow-up studies.

If labor shortages were to become a major bottleneck for wind power growth, for example because foreign labor would no longer be available, the above (lost) benefits should be included in the calculation. At this stage, however, only income tax revenues are taken into account.

Onshore

The estimated impact on income tax revenues during 2022 – 2030 is shown in Figure 6. In the calculation, the current degree of domestication is assumed. Unfortunately, degree is not known, hence, sensitivity to degree cannot be presented[2]. The cumulative total increase in income tax revenues in Finland is estimated at 240 M€.

[2] Economic benefits (€) for Finland are known but the total benefits (€) are not known, i.e. how much benefits flow abroad. Hence, the degree of domesticity is not known even though the monetary benefits to Finland are known.

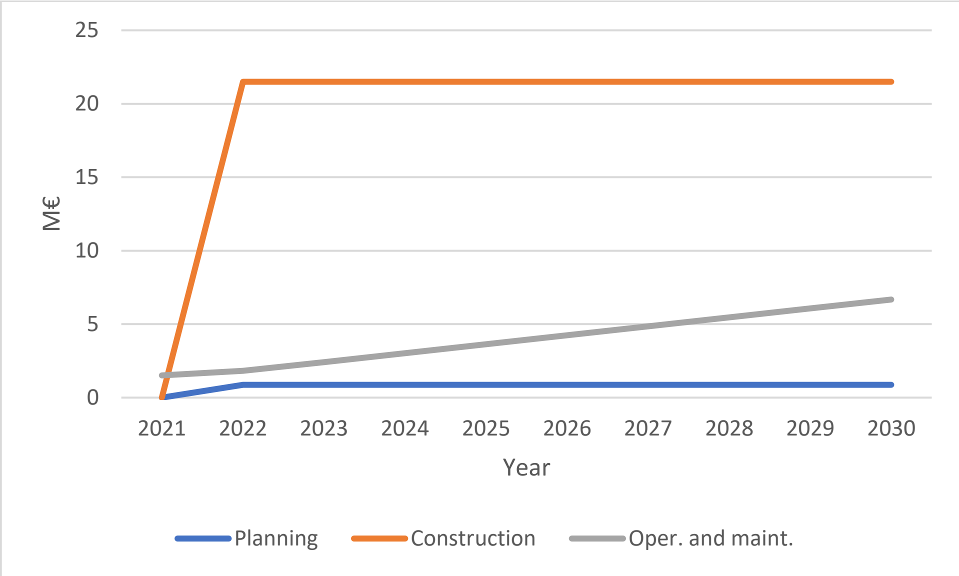

Figure 6: Annual income taxes: onshore

Offshore

As for onshore, the final impact of offshore wind power on income tax revenues depends on the degree of domestication. Figure 7 shows income tax revenues with different assumptions of the domestication degree. Cumulative revenues during 2022-2030 for offshore wind power projects are estimated at: degree = 25 % 148 M€, degree = 50 % 296 M€. The degree is calculated based on total labor demand, including turbine fabrication which are currently not manufactured in Finland (and hence 100% degree cannot be achieved).

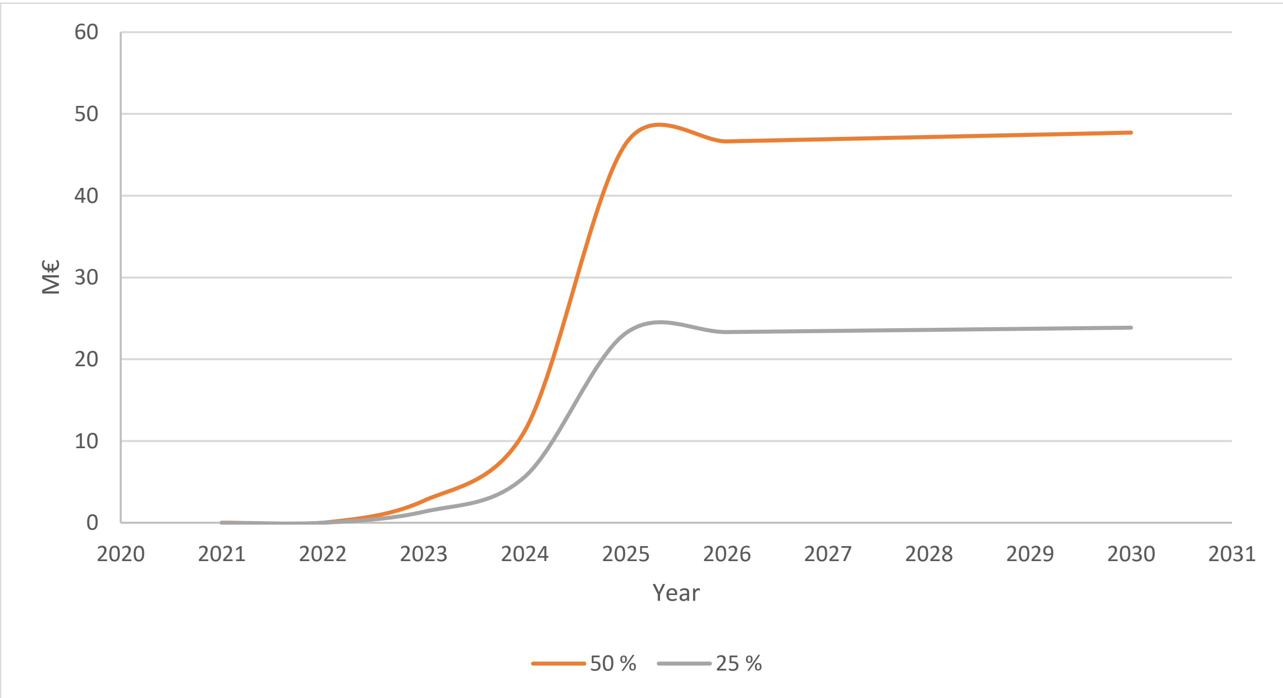

Figure 7: Offshore: annual income taxes, with the blue line assuming a skilled fully Finnish labor force (the orange line assumes a 50% degree and the grey line a 25% degree of domestication).

Discussion on impact

The eventually materializing of impact on government benefits depends on the degree of domestication. Currently a lot of labor is imported from the Baltic countries, even if the operating company is Finnish.

If the degree of domestication can be increased, the impact will be affected by how the new labor force is obtained, i.e. whether genuinely creating new jobs or just shifting labor shortages to other sectors. If labor is just transferred from sectors also suffering labor shortages, i.e. moving the problem from wind power sector to another sector, the ultimate impact is zero.

As calculated above, cumulative income tax revenues are 430 – 620 M€ depending on the amount of domestic labor. In addition to this, cost savings in unemployment benefits may also be achieved. Unemployment costs annually 8-12,000 per unemployment person. If workers are recruited and educated from decreasing sectors (inc. fossils, peat, offshore oil drilling technology, …) where the need for labor can be expected to decrease over time, or are a priori unemployed, additional savings can be achieved, and the positive economic impact is maximal. The unemployment benefit savings increase economic benefits typically 30 – 50 %, after which benefits are income tax revenues 430 – 620 M€ + savings 120 – 300 M€. Unemployment benefit savings can only be calculated in more detail during next steps and more in-depth feasibility studies. These assessments and calculations should and can be considered in the ETIB-design phase.

Wind power also generates other economic benefits for public administration. For example, property taxes do not depend on who has built the wind farm. Above it was assumed that expected capacity will be built by foreign labor if domestic labor is not available – hence property taxes were realized both in the no-ETIB-scenario as well as in the ETIB-scenario (hence not being an ETIB outcome). If wind farms are not built at all due to labor shortages, the increase in property tax revenues should also be taken into account as benefits.

Approximately 30% of value of wind power investments are subject to property tax (HE 2020). For example, average annual property tax revenue over 30 years is approximately € 22,000 per onshore-turbin (Tuulivoimayhdistys 2022). Expected cumulative property taxes during 2022 – 2030 are estimated at 237 M€ for onshore, and at 158 M€ 2022 – 2030 for offshore. These estimates are indicative only, because the exact amount of property tax is affected by many variables, like local real estate tax rate.

It should also be noted from a broader national cost-benefits analysis perspective that wind power may replace foreign energy and improve trade balance and energy self-sufficiency. A priori these benefits are independent who builds the wind farm.

5. Conclusions and next steps

Consultations with wind power stakeholders in Finland confirm that labor shortages are already significant and are expected to grow. An ETIB could provide a fast way to improve the situation, but if it is to be launched, it should be designed and set up as soon as possible to get the most out of it. While foreign workforce could be used in the absence of domestic labor, a main benefit would be an increase in the degree of domestication of wind power, which would mean that more of the economic benefits would remain in Finland. In the longer term, this would help create a more solid and comprehensive wind power ecosystem in Finland, strengthen the competitiveness of Finnish wind power solutions providers and hence create a more credible basis for accessing international offshore wind markets.

The study identifies various opportunities for addressing the identified bottleneck in skilled labor force. Retraining of current workforce would be the fastest and most efficient way for the ETIB to improve the situation. To launch an ETIB, next steps would be to specify the cost of retraining in order to get an estimate of total costs (amount of expected performance bonus and for which years) and benefits.

If the ETIB is still considered feasible after a more detailed feasibility study, which is also providing more consolidated cost estimates and comprehensive cost & benefit assessments, then a decision on the commissioner and amount of the performance bonus (required to put ETIB into action) could be elaborated.

Ample Finnish experiences of SIBs to date are available to address any of the more practical elements of developing, tailoring and tendering the ETIB. These experiences and lessons learned from the Koto-SIB/Työ-SIB (tendering, final payment mechanism including timing of payments, budgeting, etc) would allow prompt advancement with practicalities.

In the medium term (1-2 years), an outcome fund would help speed up the launch of different ETIB-projects. In practice, the fund would be a technical cash pool that could enter into several ETIB-contracts related to bottlenecks in the ongoing and forthcoming energy transitions, or strictly focus on education and labor shortage in transition from fossils to green energy.

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