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Forecasting future skills for the Green Economy

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Introduction

In this chapter, the experiences of 4 city projects are discussed in the light of skills forecasting. Respectively, the barriers they faced, the key lessons that can be drawn from their experiences, as well as the replicability of their interventions are analysed.

A preliminary analysis revealed that 4 UIA city projects contribute significantly to the skills forecasting aspect of Just Transitions: STEAM City in Aveiro (PT), IGNITION in Greater Manchester (UK), Passport4Work in Eindhoven (NL) and Vilawatt in Viladecans (ES).

Starting with Aveiro, their forecasting activities are informed by a thorough analysis of the local labour market and local economy, which are developed by its Labour Observatory. It was designed to support local businesses in the areas of the digital transition, by preparing the workforce through training and upskilling programmes for STEAM competencies (adding the "A" for arts and creativity to the existing science, technology, engineering and mathematics domains). The observatory conducts primary as well as secondary skill analyses, incorporating both macro and micro data. The former originates from EU workforce data, whereas the latter is generated through an analysis of job advertisements. The rationale for this is the fact that certain vacancies remain unfilled for a long period of time, due to their lack of marketing appeal. Simultaneously, the primary analysis reveals specific qualification and requalification needs for employers in the region.

Greater Manchester, in a similar fashion to Aveiro, also engages in a first-hand analysis of skills supply and demand through its dedicated Greater Manchester Combined Authority (GMCA) Skills Intelligence Team. Drawing on a combination of quantitative trends and qualitative anecdotal evidence, their insights are deepened in a collaborative effort with key employers, industry representatives and sectoral stakeholders. This information's utility is two-fold: it is used to inform policymaking and funding decisions, but also to support employers active in the green technologies and services sector through the publicly available knowledge base of the IGNITION project (which serves to promote nature-based solutions in the region). For example, in a recent report, the regional status quo on retrofitting skills was presented, highlighting skill gaps and mismatches, their origins and remedial courses of action[1].

Eindhoven, the epicentre of the Dutch high-tech Brainport region, also emphasizes skills intelligence in its Passport4Work (P4W) project. The project has a dual nature, where the development of an innovative, gamified online career platform (with both an assessment and job matching function) goes hand in hand with the promotion and facilitation of a skills-based economy across the Netherlands. While the project's origins are not rooted in the Just Transitions theme, its relevance is apparent. Two out the three industry sectors the project is targeting (construction, and the technical industry) play a critical part in the country's nationwide transition from fossil fuels towards green energy. The project addresses the experienced shortages in these sectors by contributing to a transparent, and skills-based labour market, in which skills precede over diplomas and past work experience. By doing so, it aims to increase the inclusion and participation rates of its most vulnerable citizens while also catering to employer needs.

Viladecans is striving to become a climate-neutral community, with an active role for its citizens. In this process, realizing a drastic energy renovation of its residential buildings is one of its (and many European counterparts') key priorities. By implementing an ambitious and unprecedented public-private-citizen governance partnership, it aims to realize a strong sense of community and collaboration among all stakeholders involved in the energy transition. Facilitating this transition, and at same time empowering its vulnerable citizens is inherently tied with skills forecasting.

In each of these four cities there is a growing concern that the competences of the workforce are not aligned with those required for the green transition. In the case of Aveiro, the growing relevance of digital competences for the implementation of the municipal's energy transition plan is a main driver for its forecasting activities (which ultimately guide re- and upskilling activities). Similarly, in Manchester, more workers with specific retrofitting skills are required for its large-scale replacing of grey with green infrastructure. In both the cities of Eindhoven and Viladecans, a lack of occupational information reflecting the implications of the green transition is putting its already vulnerable citizens at even larger risk. In Eindhoven, for example, this is impeding the development and installation of low-carbon solutions, for which the appropriate skills are currently lacking.

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[1] GM – Industry Labour Market and Skills Intelligence Report (2020) https://www.greatermanchester-ca.gov.uk/media/4250/industry-labour-market-and-skills-intelligence-report-low-carbon-buildings-v1.pdf

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1. What barriers do cities face in skills forecasting for the Green Economy?

There are several common threads with regards to the barriers experienced by cities in the light of skills forecasting, as well as unique ones due to the specific nature of some of the city's approaches.

Skills forecasting is a complex endeavour

The first barrier stems from the relatively limited number of cities we found pro-actively engaging in skills forecasting. The fact that the analysis resulted in the identification of only four specific city examples is illustrative of the complex nature of this task, which is often conducted at the national or regional, rather than the city-level. Cities typically lack the appropriate capabilities and resources to organize this themselves.

Data collection is complex for SME's

One barrier encountered in Aveiro in their primary data analysis pertains to gathering the data on job

advertisements itself, which was a complicated process depending on the organization's size. Whereas large organizations typically develop this in-house as part of their corporate strategy, smaller firms are often found to externalize this, making it much more difficult to obtain.

A broad level of support among all stakeholders

As illustrated in the inception report, there are distinct groups which are facing the highest risk of being left behind (e.g. vulnerable workers, low-skilled, older people, the self-employed). To ensure their social inclusion, broad support levels among all stakeholders need to be realized. In Aveiro, for instance, the success of its low-carbon policy depends on support of the national, regional, and local authority levels. After all, a consistent and holistic vision is vital for the realization of employer support. Ultimately, companies need to be aware of the skill implications of just transitions in the process of making the shift towards a low-carbon economy. In Viladecans, realizing a collaborative culture among the transition's key stakeholders to achieving the desired high-level impact results was identified as one of the project's most critical barriers. While this is a challenge applicable to all cities involved in the energy transition, in the case of Viladecans it reflects an actual project outcome, rather than serving as a mere success factor. Skills forecasting plays a crucial role in this.

An outdated perspective on green skills

The outdated nature of definitions and classifications is impeding many skills forecasting activities. In case of Viladecans, the insufficient information available on the vocational skill needs for "green jobs" hindered the increasing demand for their targeted building renovations.

A practical implication for the Manchester IGNITION team was that it has been difficult to identify and reach out to companies in the green technologies and services sector. They may not always self-identify as a green organization, and also lack formal recognition thereof. To illustrate, the standard industrial classification (SIC) is not fit for purpose considering it does not reflect up and coming "green organizations".

Beyond the formal side of things, and arguably related to the matter, perceptions are also an obstacle to overcome. "Green jobs" are often associated with traditional occupations such as Marine Biologists or Ecologists. However, the energy transition is mostly dependent on modern occupations such as scaffolders (to install solar panels) and electrical engineers. There is still work to be done to "update" the current perspective. This experience was also a key issue in the Rotterdam BRIDGE project, described in Chapter 3 "Skilling Reskilling".

Accreditation as a bottleneck

In Manchester, accreditation was found to be a bottleneck in its current form. In order to work as a retrofitting installer, specific accreditation is required. While this serves an important purpose - quality assurance - it impedes the influx of new workers in an otherwise already tight job market. Furthermore, the stipulated standards only partially reflect the new skills and competencies involved in retrofitting projects. Viladecans' approach (further detailed on page 20) might help remediate this, through their creation of new "green" professional profiles with specific training modules included.

A lack of transparency on jobs and skills

The barriers faced by Eindhoven were mostly related to the lack of transparency on jobs and skills due to a lack of standardization. There is a plethora of skills systems and frameworks in place, with varying degrees of interpretation for the underlying skills. This complicates matchmaking and places a burden on both the job seeker and the employer, who have to invest in significant resources in pursuit of a perfect match. For vulnerable job seekers in particular, this can be very taxing on their motivation and engagement levels, representing an additional barrier.

Job matching is a complex matter altogether, illustrated by the2010 Nobel Prize in Economics which was awarded to the economists Diamond, Mortensen and Pissarides who made this their subject of research (and appropriately drew an analogy to the dating market). In theory, automated matchmaking in a platform such as Passport4Work holds great potential for transparent labour markets, with far fewer mismatches occurring. Here, all variables relevant for a job match can be taken into consideration, reducing bias in human decision making (Hmoud & Laszlo, 2019).

However, this is not an easy feat, illustrated by research byFrank et al. (2019) towards automated job matching.

This research highlights three specific barriers to consider. First of all, the lack of high-quality data about the intricacies of an occupation and its underlying skills, to accurately reflect the dynamic nature of jobs and the implications of advancing technology. Second, forecasting models are limited by the uncertainty around technology's impact on labour, meaning that past trends are not necessarily indicative of the future. Upskilling and reskilling programs require micro-scale insights in occupational requirements, worker capabilities as well as their interdependencies with the broader labour market context. Third, aggregate labour market data lacks regional specificity. After all, some cities are more susceptible to technological change than others, calling for regional differentiation.

Facilitating lifelong learning for the most vulnerable citizens

To face the experienced shortages in the demand for green skills, the development of appropriate professional skills among the regions most disadvantaged groups is an important prerequisite for both the realization of the green transition, as well as maintaining an inclusive society for all cities. By encouraging lifelong learning through both training and accreditation among vulnerable, unemployed (or career shifting) workers, they can build the necessary skills of both today and tomorrow. For this to happen, a structure needs to be in place in which skills forecasting activities inform career orientation and development activities for all citizens, to maximize their employability levels.

2. What key lessons are emerging in relation to skills forecasting?

A flexible data collection approach is required

As a result of the encountered different "access points" for data in smaller, medium-sized and large firms in Aveiro, the observatory had to be flexible in their data collection approach; making sure that they were in touch with the appropriate individuals for the data gathering, their recruitment strategy, and subsequently the analysis of the data (which was often not uniform in terms of structure as well as content).

Specific company needs call for specific forecasting data

In all cities, skill forecasting was done on the basis of in-depth occupational analyses. For example, in the case of Greater Manchester, by focusing on an in-depth analysis of the most critical green skills for its overhaul of grey infrastructure, targeted interventions could be devised to prioritize and address skill shortages. Similarly, in Eindhoven, the specific occupational needs of solar panel installers were researched to inform the development of appropriate training programs for upskilling and reskilling purposes.

Aveiro's Labour Observatory produces analyses and reports on a regular basis through a combination of secondary EU workforce data and primary data on job advertisements. In its current form it produces valuable analyses and outputs which have guided several skilling and upskilling activities for local talent in the region, amongst which is its Tech City HUB and various Tech Labs responsible for building foundational digital skills. One of its innovative outputs is the "Competence Board", a tool which allows for the identification of trends in the demand for competences through an analysis of job advertisements.

However, in order to further involve the local economy in the transition process, more tailormade services are required for companies. This can be achieved by complementing its research on job ad appeal with deeper analyses on specific job and skill characteristics. By increasing the responsiveness of its outputs (for example, by implementing a dashboard function which allows for business specific queries), the design of training and upskilling programmes can be adjusted even more to specific company needs and demands. To cater to this need, Aveiro is currently looking to expand the scope of its services as part of their strategy of gradual upscaling to other regions. The main feature of this increased responsiveness is the addressing of specific business queries through a dashboard function with flexible data analytics options.

Linking forecasting data to education is key

In the case of Aveiro, with STEAM City's activities being ingrained in education, it has become apparent that a deeper integration is required of its forecasting activities and training programmes to increase the participation rate of the target users. This can be achieved by awarding formal ECTS's (European Credit Transfer and Accumulation System) for involvement in the training programmes.

A second lesson of Greater Manchester's work in this regard can be distilled from their approach towards the identification of apprenticeship pathways in education. By linking the required skills from their forecasting models to the European Qualification Framework (EQF), the conditions are in place for a translation of labour market needs into educational curricula. This can contribute to a universal issue: closing the gap between educational outcomes and business requirements.

A taxonomy-based approach to skills forecasting

Similar to Greater Manchester, Eindhoven is using O*NET as a frame of reference for its forecasting activities. O*NET comprises approximately 250 measures of skills and other job characteristics for over 1000 occupations. In the Passport4Work platform, this data is used for job matching, while simultaneously addressing skill gaps through eLearning modules. On the one hand, this reduces bias in human decision making, while on the other hand it facilitates lifelong learning processes. Above all, it increases the transparency level of the labour market as a whole.

In the Passport4Work project, skill forecasting is central to the development of its online career platform. Several skill forecasting lessons can be drawn from the project, related to the incorporation and contextualization of a skill taxonomy, and the development of strategic partnerships.

Upon analysing the taxonomy, however, two concerns emerged. The first pertains to the overly complex and abstract nature of its contents and wording[1]. A key first step for the project in this regard has been to translate the relatively academic contents of O*NET to the Dutch language, on the more basic B1 language level (of the Common European Framework of Reference). To illustrate with an example, the original definition of persistence: "the job requires persistence in the face of obstacles" was replaced with "I do not give up when things are not going my way". The translations were tested by the target beneficiaries of the platform, to ensure their understanding of the skills included in the assessments and job matching.

A second concern that emerged, was that the number of skills included in the taxonomy made the scaling of related skill assessments an impossible task. Hundreds of assessments would need to be developed to cover all the included skills. To remediate this, through psychometric analysis, overlapping skills were clustered together, to reduce and simplify the skill assessments based on the forecasting activities. For example, the skills 'service orientation', 'social perceptiveness' and 'concern for others' can be grouped as "social skills". As a result, far fewer assessments were necessary without compromising the quality of the assessments and their validity.

The third concern about O*NET's data on occupations and skills was its regional bias, since it was researched in the context of the U.S. labour market through surveys among its employers and employees. These surveys reveal the relevance of a skill (on a 1 to 5 scale), as well as the level required of a skill (on a 1 to 7 scale) for each of the O*NET occupations. To make sure the data made sense for the Dutch labour market, the O*NET surveys were translated to Dutch and distributed among thousands of Dutch employers and employees (for each of the three sectors targeted by the project, healthcare, construction, and the technical industry). Subsequently, interviews were held with industry experts to deepen the survey insights in terms of their implications for upskilling and reskilling. By doing so, the regional specificity of the Dutch labour market could be adhered to in the platform's job matching.

Apart from its regional bias, the O*NET taxonomy was also found to be relatively static in terms of its contents. Its occupational skill profiles do not include information on the implications of technology and robotics. To account for this, a future skills dimension was added to the Dutch O*NET survey, allowing for the identification and connection of skills which are the most susceptible to new technologies.

In a similar fashion, Viladecans seeks to bridge the gap between skill demand and supply through detailed specifications of the competences involved based on the European Classification for Occupations and Skills (ESCO). By differentiating between basic, transversal and technical competencies, targeted labour intermediation can take place. These specifications are created through prospecting, interviews with business representatives and an analysis of the city council's company database. This information is summarized in nearly 100 occupational fact sheets in a wiki-like format, to help inform citizens on the skills highest in demand on the labour market. This is done in collaboration with the Barcelona Provincial Council in the XaloCompetencies project, to expand the reach of information.

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[1] Handel, M. - The O*NET Content Model: Strengths and Limitations (2016)
https://www.researchgate.net/publication/295834355_The_ONET_content_model_strengths_and_limitations

A collaborative approach to yield results

A lesson can be drawn from Eindhoven is its collaborative approach. Rather than reinventing the wheel, Eindhoven has joined forces with other labour market regions and projects involved in the forecasting, reskilling, and upskilling of skills. By doing so, the impact of its forecasting work has increased dramatically.

New certificates of professionalism for green jobs

This lesson stems from Viladecans' unique approach to the certification of professionalism. As observed in the Manchester case, these procedures can impede the influx of new labour market entrants. By creating new certificates, incorporating the intricacies involved in green economy professions – such as photovoltaic installations, storage technologies and environmental management – it can be guaranteed that individuals possess the appropriate knowledge, skills and aptitudes for these relatively new occupations. The process of certification includes a practical training module, aimed at the green economy and its specific requirements.

Skills forecasting as a basis for enabling vulnerable citizens

Viladecans and Eindhoven both seek to enable its most vulnerable citizens through In the case of Viladecans, by offering a service of orientation and support around its forecasting activities and the professional certification process, the employability of its jobseekers is strengthened, while also promoting their inclusion in society and contribution to a green economy. Similarly, in Eindhoven, the Passport4Work platform provides a structure for the professional development of its citizens through targeted assessments and integrated eLearning modules.

3. What successful approaches can be replicated and scaled?

A dedicated forecasting entity

Aveiro and Greater Manchester's realization of a dedicated forecasting entity (the Labour Observatory and Skills Intelligence Team, respectively) are both replicable and scalable. It is crucial for monitoring the job profiles which are most needed on the medium and long term, with considerable impact on the creation of green and sustainable jobs, but also to allow for a reorientation of training in the local economy towards disciplines experiencing a skills shortage.

By institutionalizing the analysis of current and future skill needs in the public domain, appropriate labour market policies and trainings can be designed while also informing the private sector's strategy for talent sourcing, upskilling and reskilling. The potential for scalability extends beyond the direct vicinity of cities, holding strong regional and national promise for lessening the gap between labour market demand and supply. The adopted triple-helix approach, in which the local government, university as well as businesses are represented, contributes to the furthering of each of their interests as well as the green transition.

The case of Aveiro shows that replication and upscaling are best conducted in a phased manner. In its current form, the Observatory performs robust analyses on the appeal of job advertisements, reflecting a current need in the Aveiro region for a better marketing of open vacancies. As part of its upscaling strategy, deeper job and skill requirements are being added to the outputs of its Observatory.

A strong occupational approach

In Greater Manchester, the forecasting work done by the Skills Intelligence Team is highly relevant for other cities and regions. Its models are based on in-depth and dedicated research towards the specific retrofitting occupations involved in the realization of low carbon buildings. The resulting intelligence has revealed actionable insights in specific retrofit skill needs, allowing for a prioritization among occupations facing the highest risks in terms of shortages. Based on this prioritization, targeted interventions could be designed for new entrants into the job market, including upskilling and reskilling activities.

Similarly, Eindhoven's analysis of occupations related to the Dutch energy transition informs relevant reskilling and upskilling programs. This highly contextual approach, reflecting the region's specific needs and demands, is

highly transferable to other regions faced with a green transition.

An evidence-based approach

Finally, the evidence-based approach of GM has been one of the causes of its success and has great replication potential. After all, the extent to which skills forecasting and appropriate reskilling and upskilling activities are applied, largely depend on the benefits they provide. By providing tangible insights in the economic, social and environmental benefits of nature-based solutions through GM's NBS Evidence Base, a strong case is made for policy-makers, investors and GM's community at large to embrace this transition. This serves as a forceful model for other regions involved in awareness and engagement building of its community.

A multi-stakeholder approach

One replicable characteristic of the Eindhoven project is its multi-stakeholder approach. In The Netherlands, there are multiple projects and initiatives involved in the transition to a skills-based economy. On the regional level, for example, Amsterdam is working on overlapping objectives. On the national level, efforts are being made to establish and govern a national skills language: CompetentNL. By reaching out to these stakeholders in the early stages of the project, strategic partnerships could be formed through which efforts were combined. The translation of O*NET, for instance, was a joint initiative with the Amsterdam region, whereas the results of the O*NET survey will serve as an input for the national skills language. This collaborative approach of the project has already allowed its impact to increase beyond its immediate geographical vicinity.

Taxonomy-based forecasting

Passport4Work's incorporation of an existing skill taxonomy also has great replication potential. By implementing O*NET, a robust framework was in place on which basis skill forecasting, skill assessments, job matching, reskilling as well as upskilling modules could be developed. By going one step further and revalidating the U.S. skills data in the Dutch labour market context, the project could both benefit from the structure provided by the taxonomy, as well as its underlying Dutch data. This is a highly scalable approach, where further replicating the O*NET surveys in other urban cities could facilitate labour mobility across European borders. Furthermore, the use of psychometric analysis provides significant upscaling benefits for skill gap remediation in cities. Through systematic clustering, in which the commonalities between skills are established, a broad range of skills can be assessed and developed through a select number of assessments and eLearnings.

One replicable strength of Viladecans' forecasting activities is the systematic definition of professional profiles appropriate to the circular economy. To ensure the recognizability and transferability of the data, the European Classification of Skills, Competences and Occupations (ESCO) was used a frame of reference. ESCO, to some extent, can be considered the European counterpart of the U.S.' O*NET taxonomy employed by Eindhoven. Their commonalities are that they both provide highly standardized information on the skills related to an occupation, contributing to labour market transparency across regions and borders.

By using a skill taxonomy (such as O*NET or ESCO) as a frame of reference, the applicability of the forecasting analyses can be extended to other regions, both in terms of industry-specific insights as well as the underlying methodology potentially serving as a blueprint for research towards other industries.

Accessible information for all stakeholders

Another replicable feature is represented by Eindhoven and Viladecans' focus on the accessibility of information on skills forecasting. In this case, accessibility stems from its complexity. Given the fact that Passport4Work's core audience comprises vulnerable jobseekers with a distance to the labour market, ensuring that all users of the platform understood the information pertaining to skills and its underlying behavioural aspects. This was achieved by translating all information related to (future) skills to the more accessible B1 level, was proving to be critical for their engagement and inclusion.

Beyond the systematic definition, the relaying of key information on jobs and skills to job seekers in a comprehensible manner is a challenge for most urban cities involved in just transitions. The employed methodology of accessible resources (in wiki technology format) and occupational fact sheets in Viladecans[1] through the XaloCompetencias project, is highly scalable and helps improve citizen understanding of the green economy and its implications. This also underlines the value of adopting a functional urban area (FUA) approach,

reflecting the reality of the metro-regional economy and travel to work area.

[1] Viladecans is leading an URBACT/UIA transfer pilot network exploring ways to replicate its model in three other cities

New certification of professionalism

A both replicable and scalable feature of the Vilawatt project is the creation of nationally recognized certificates of professionalism for green jobs, including specific training modules for each of the professions. By coupling skills forecasting data with the specific trajectories of each of these certificates, a perspective-based approach can be used to address both current and future skill needs.

Integration with education

GM's incorporation of the European Qualification Framework in its skills intelligence allows for integrated curriculum planning around future skills, by formalizing apprenticeship pathways within the educational domain. Similarly, Aveiro's envisioned awarding of ECTS for its training programs allows for the realization of an incentive-based approach by cities.

An ecosystemic approach

Aveiro and Viladecans emphasis on ecosystemic governance are also transferable to other cities. While Aveiro's Labour Observatory is organized in accordance with the Triple Helix principles, the same principles should be applied to the required societal actions. One of the implications is that the designing of appropriate university courses should be a co-creative effort, with the active involvement of the government, universities as well as businesses.

In the case of Viladecans, its unique approach, with an active role for its citizens and entrepreneurs in its Public Private Citizen Partnership (PPCP), is worth replicating. By involving the citizens in decision making, providing a support structure for those in need, and combining the benefits of a city-wide sustainable construction model with a tangible business case for entrepreneurs, a compelling precedent is created where skills forecasting work is translated into tangible opportunities for all stakeholders involved.

4. Key messages

Taking the four cities' contributions towards skills forecasting into consideration, a few common themes occur. The lack of structural, up-to-date information on green occupations and its skills is a shared barrier across all cities. In part, this can be explained by traditional perceptions of these occupations. As highlighted in the Greater Manchester case, people often associate "green jobs" with traditional occupations such as marine biologists and ecologists. This is problematic, with community engagement and awareness playing a pivotal role in the securing of investment opportunities. As such, providing current and transparent information on the green transition, and its skill implications, is an important prerequisite across urban areas. Public-private partnerships are required for this, to allow for an effective implementation of skill certifications, dedicated training modules, and lifelong learning opportunities for cities' most vulnerable citizens.

The city cases show us that the provision of skill intelligence can occur through a systematic analysis of labour market demand and supply. When basing this analysis on an existing skill taxonomy, it can be assured that the outcomes can be recognized and used across regions. However, despite the contributions from the taxonomy to a systematic analysis, there are a few specific areas for improvement. These areas are the complexity of taxonomy, their adaptability, their geographical bias and their inability to predict the impact of technological change on the labour market.

The cities have contributed to this in several innovative ways. One example is the replication of the O*NET study to the Dutch labour market context in the Eindhoven example while increasing its adaptiveness through adding a future skills dimension. In Greater Manchester, the extensive analysis of their specific retrofitting needs has allowed for the region to design appropriate skill-based interventions. In the case of Aveiro its dedicated labour observatory has provided a unique perspective on the marketing appeal of job advertisements in the light of it's an experienced shortage of tech staff in the region.

Beyond the analysis or skills, cities have also devised unique approaches to the embedding of skill intelligence into suitable policies and interventions. In Viladecans, for example, the newly created certificates of professionalism have contributed to the formalization of reskilling and upskilling activities of new skills for green jobs. In the Eindhoven the skill forecasting intelligence serves as direct input for its skill assessments and skill e-learnings.

Along these processes, it has become apparent that investing in the active participation of all the energy transition's stakeholders serves as an important accelerator. By giving an active voice to both the public and private sector as well as its citizens, they become more invested in the necessary changes and the societal benefits. Greater Manchester's Living Lab, NBS Evidence Base and Viladecans' PPCS model are prominent examples of this.

When looking at the replicability of the cities' efforts, a few best practices can be identified for other cities. First, the embedding of a skill analysis in an existing structure. Second, the appointment of a dedicated skill forecasting entity. Third, an emphasis on the specific regional context in which skill forecasting takes place. Fourth and finally, to invest in the accessibility of information for all stakeholders to increase their understanding and engagement levels.

Summary

City	Barrier	Key lesson	Replicable features
Aveiro	Data collection more difficult for smaller organizations	A flexible data collection approach is required (both in data gathering and analysis)	Dedicated Labour Observatory
		More tailormade services are required to address specific company needs	Institutionalizing of skill forecasting in the public domain
	Employer support hinges on support of local, regional and national authorities	A deeper integration of the training programs in education is required	Responsive dashboard function for specific data analytics
Greater Manchester	Many skill definitions and classifications are outdated	An in-depth analysis of critical green skills is required	Regional Skills Intelligence Team

	Perceptions of “green jobs” are traditional and do not reflect modern occupations	Community awareness and engagement is best developed through tangible results	Evidence-based approach to community engagement
	Accreditation of skills in its current form is an artificial bottleneck	Linking trainings with the EQF framework, closes the gap between education and the labour market	Analysis grounded in O*NET and interventions linked to EQF
Eindhoven	A fragmented national landscape in terms of skill definitions and standards	Aligning the project with national stakeholders in an early stage has increased its impact	Multi-stakeholder approach
		Embedding forecasting activities in a national skill taxonomy benefits the common understanding of skills	O*NET as a main building block for forecasting, reskilling and upskilling
	A lack of high-quality data on occupations and its underlying skills	Accessibility of information is key for engaging vulnerable citizens	Reducing information complexity through B1 level translations
		Through psychometric analysis, skills can be clustered, causing efficiency gains for both assessment and matching	Scalable skill gap remediation through psychometric analysis
	Uncertainty around technology’s impact on labour	By adding a future skills dimension in the employer survey, short and middle-term projections can be made on the relevance of specific skills	Contextualization of a skill taxonomy to a specific region’s needs
	Labour market data often lacks regional specificity	Contextualization of aggregate labour market data is key	Replicating O*NET survey in other regions
		Detailed specifications of occupational profiles based on ESCO allow for targeted skill interventions	Systematic definition of occupational profiles based on ESCO
Vilade cans	Insufficient information on skills needed for green jobs	Accessibility of information can be increased through occupational fact sheets and wiki-based contents.	Accessible skill forecasting intelligence

Developing appropriate skills through lifelong learning for the city's most disadvantaged groups	Through new certifications of professionalism & specific training modules, perspective can be provided through formalized career pathways	Creation of certificates of professionalism for new green jobs and skills
Realizing a collaborative culture among the transition's key stakeholders	Through an ecosystemic approach, the engagement of all the transition's stakeholders is increased	Active involvement of citizens and businesses through a PPCP model

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