

Green transition: a labour market perspective

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E MANAGEMENT



The policy framework

- Since the financial crisis in 2008-09 economic strategies have referenced the «green growth» of some kind.
- The greening of the economy has been seen as a pivotal element for post-crisis recovery (what about COVID-19?)
- The current framework develops around the EU Green Deal:

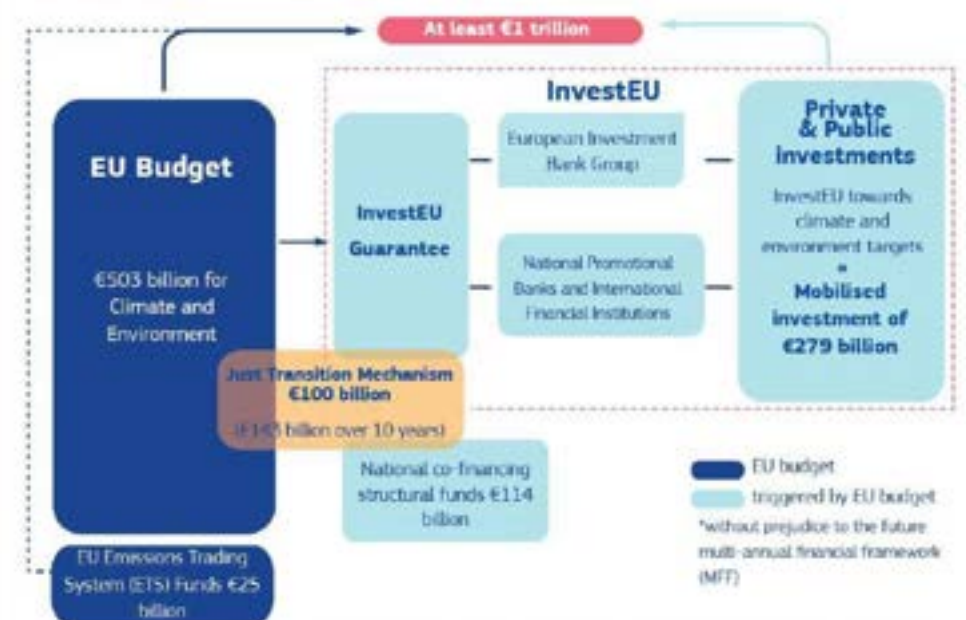
THE EUROPEAN GREEN DEAL INVESTMENT PLAN

Mobilising at least **€1 trillion** of investments over the course of 10 years, thanks to the combined:

- capital from EU and national budgets;
- public and private investments;
- additional measures to facilitate and boost green public and private investment;
- attractive investment conditions;
- technical assistance to help investors in selecting sustainable projects.



WHERE WILL THE MONEY COME FROM?

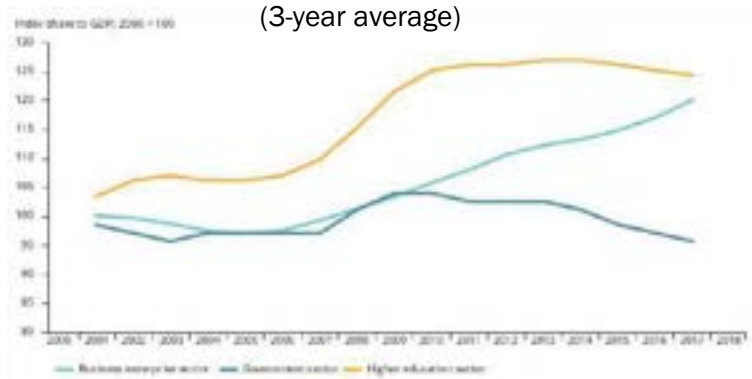


*The numbers shown here are net of any overlaps between climate, environmental and Just Transition Mechanism objectives.

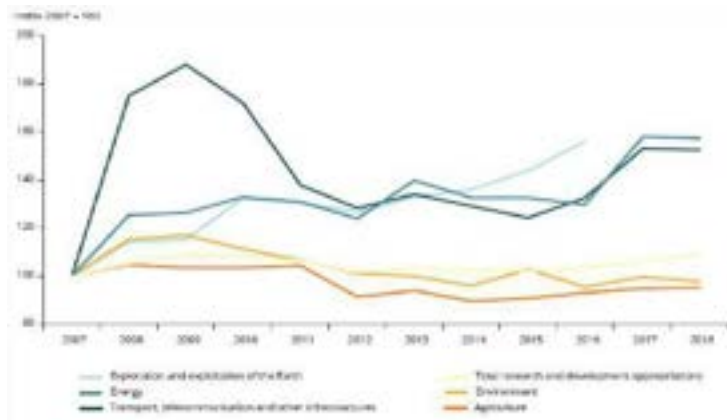
The technological side

Input proxies: R&D expenditure

Trends in gross domestic expenditure on R&D by sector in the EU, 2000-2018

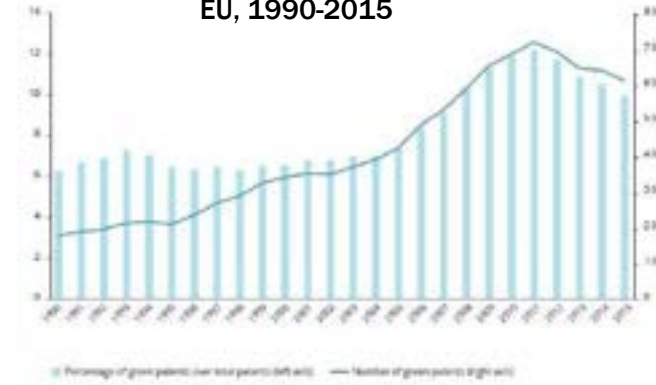


Government R&D spending for resource-related objectives and total R&D appropriations in the EU, 2007-2018, at constant 2010 prices

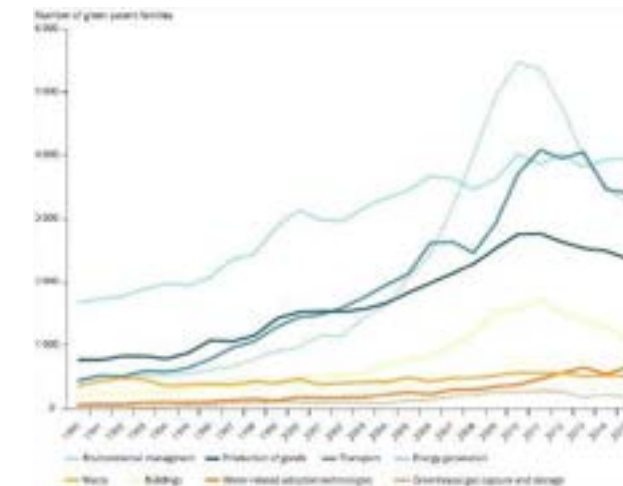


Output proxies: Green patent families

Number of green patent families and their share (%) of total patent families in the EU, 1990-2015

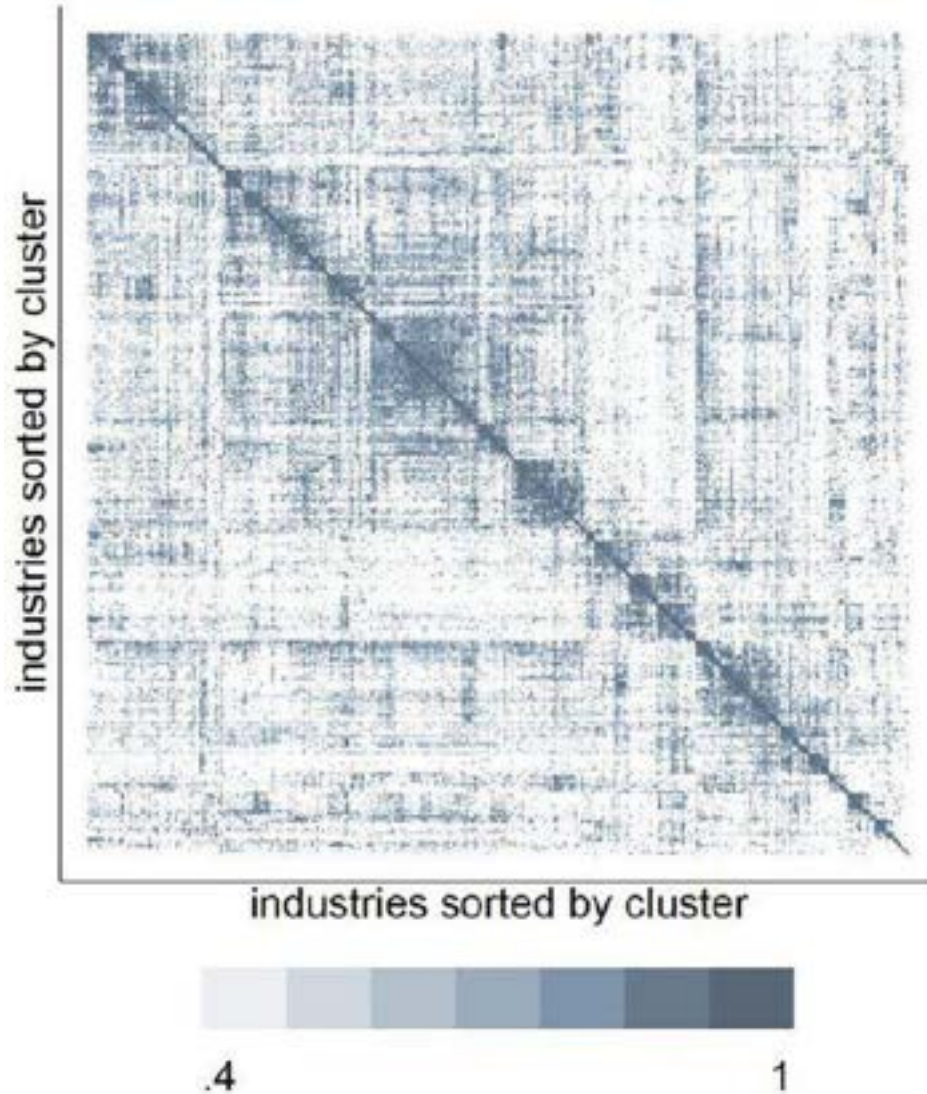


Number of green patent families by Env-Tech technological domain



Source: Figure 3.5 and 3.6 EEA Report 2020. Based on Eurostat data

The labour market



Most of the cross-industry labour flows take place outside the same industry

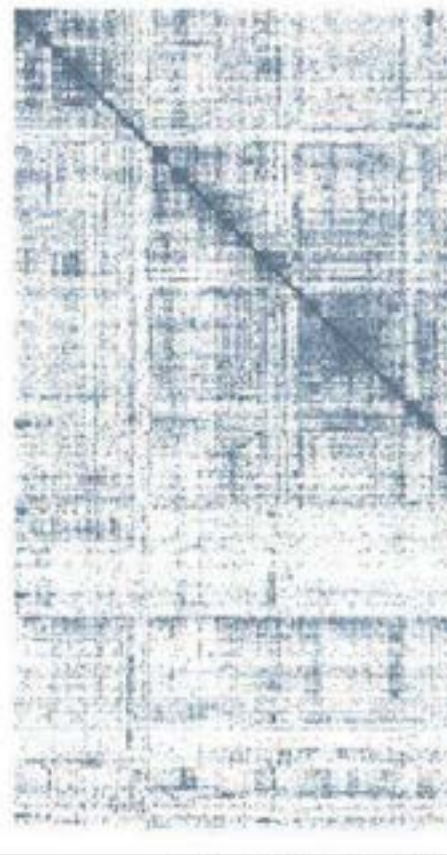
BUT

labor flows are channeled along (persistent) tight paths (Neffke et al., 2017)

HOWEVER

within-job mobility is much higher than between-job occupational mobility (Bachmann et al., 2019)

industries sorted by cluster



industries sorted

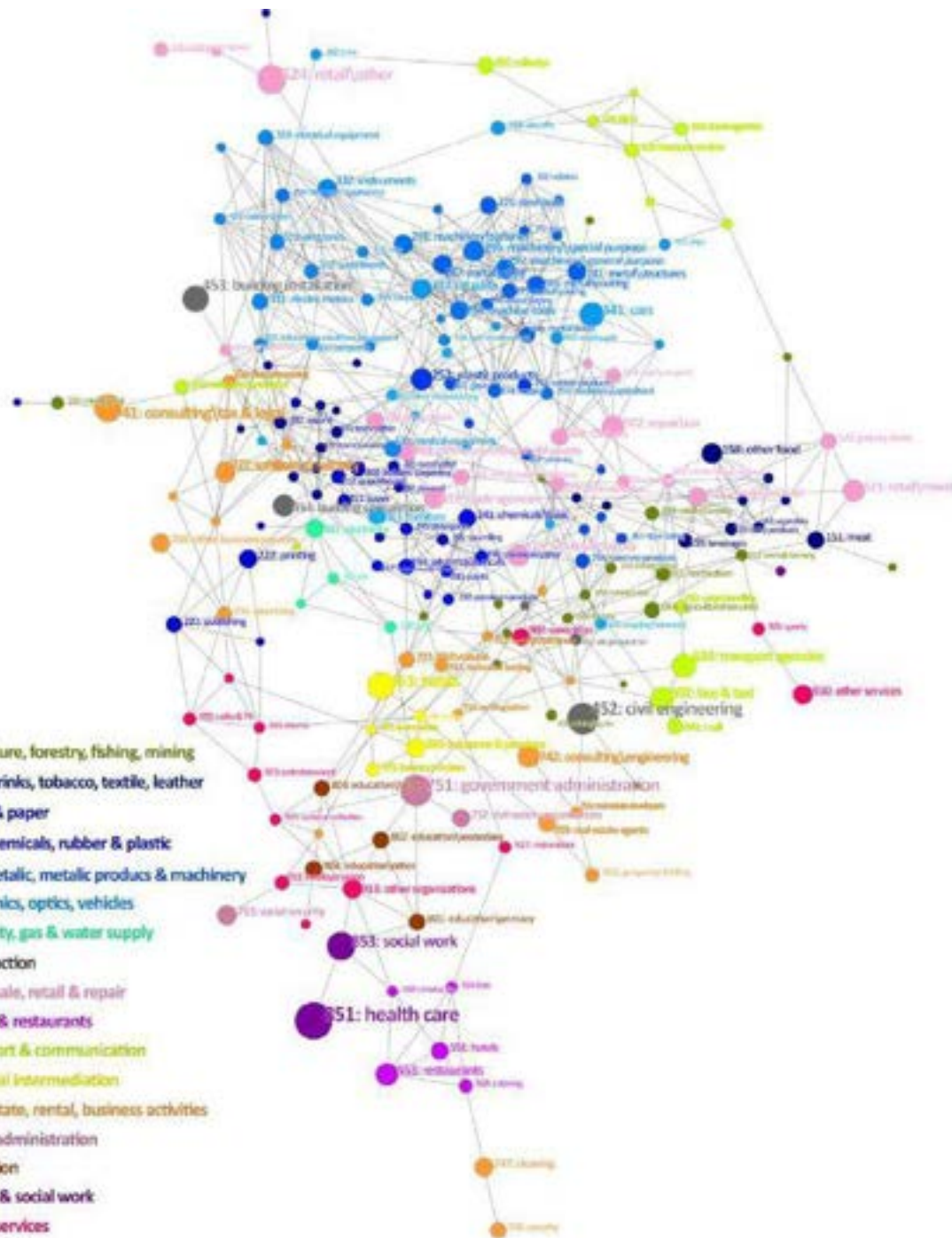


.4

b

Legend

- Agriculture, forestry, fishing, mining
- Food, drinks, tobacco, textile, leather
- Wood & paper
- Fuel, chemicals, rubber & plastic
- Non-metallic, metallic products & machinery
- Electronics, optics, vehicles
- Electricity, gas & water supply
- Construction
- Wholesale, retail & repair
- Hotels & restaurants
- Transport & communication
- Financial intermediation
- Real estate, rental, business activities
- Public administration
- Education
- Health & social work
- Other services

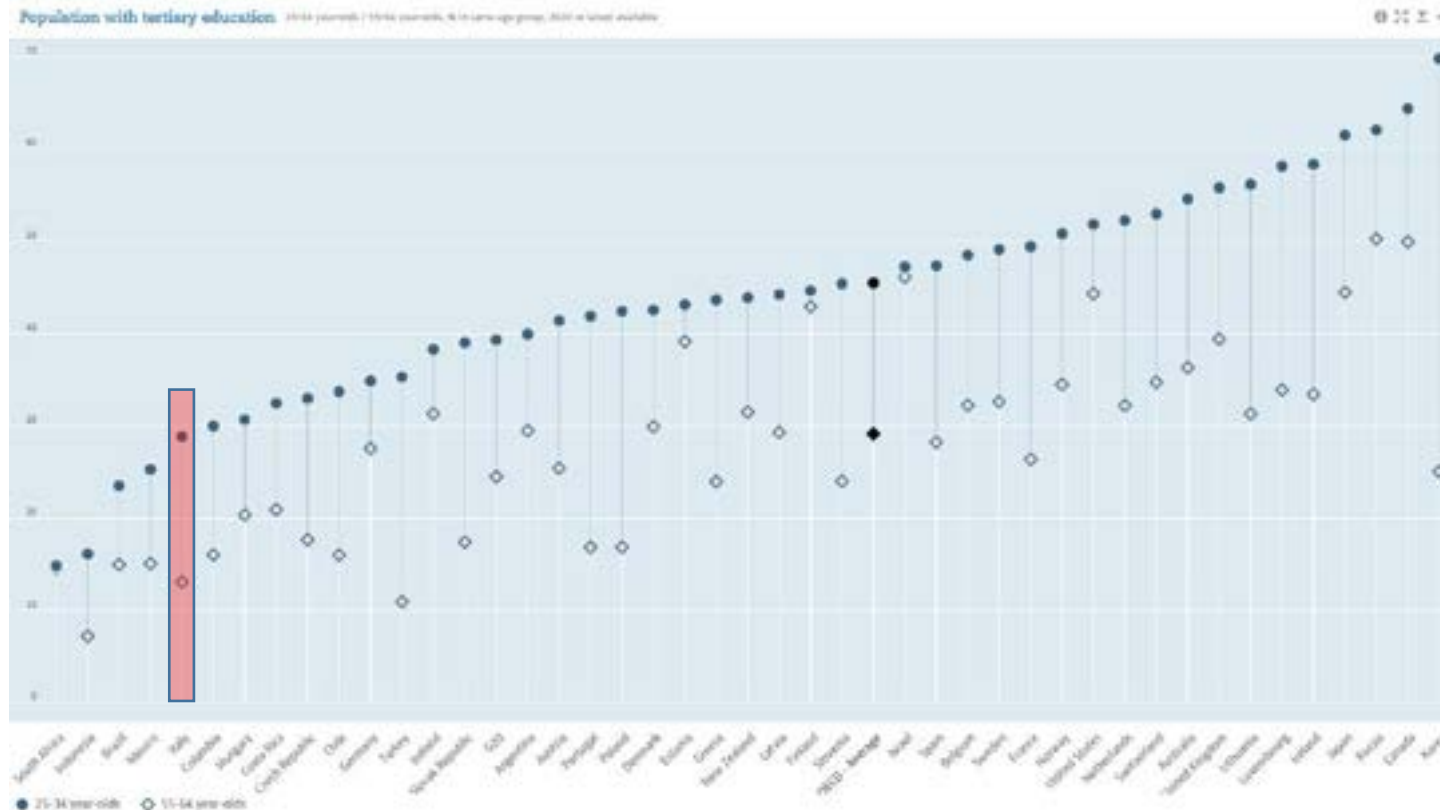


our flows take place

ong (persistent) tight

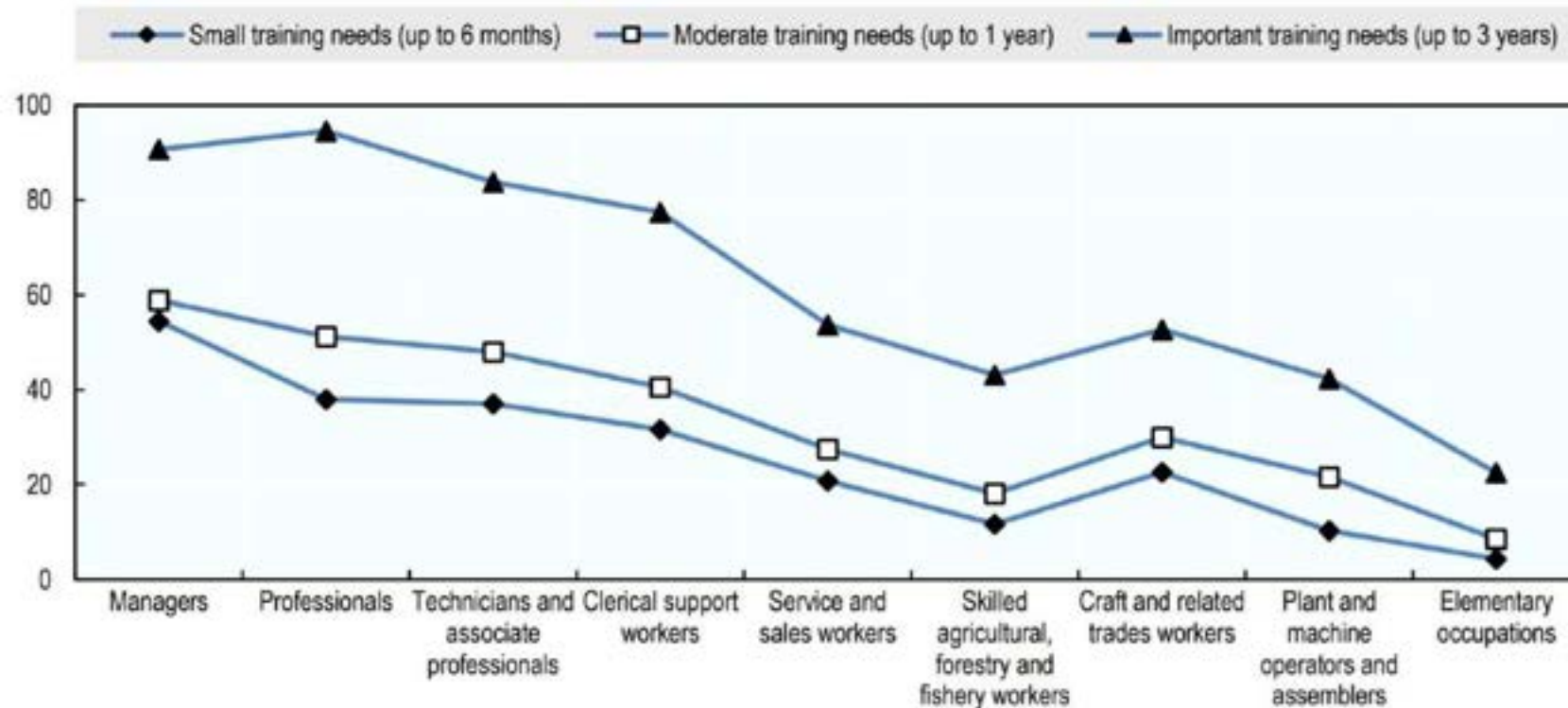
The issue at stake

- For a full take-off of the green transition, private and public institutions need to provide the proper set of skills and competences.



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Green jobs and skills: in industry

The environmental goods and services sector, abbreviated as EGSS and also referred to as environmental economy or eco-industries, consists of a heterogeneous set of producers of goods and services aiming at the protection of the environment and the management of natural resources.

Environmental goods and services are products manufactured or services rendered for the main purpose of:

- **preventing** or minimising **pollution**, degradation or **natural resources** depletion;
- **repairing damage** to air, water, waste, noise, biodiversity and landscapes;
- **reducing**, eliminating, treating and managing pollution, degradation and natural resource depletion;
- carrying out other activities such as measurement and **monitoring, control, research and development, education, training, information and communication** related to environmental protection or resource management.

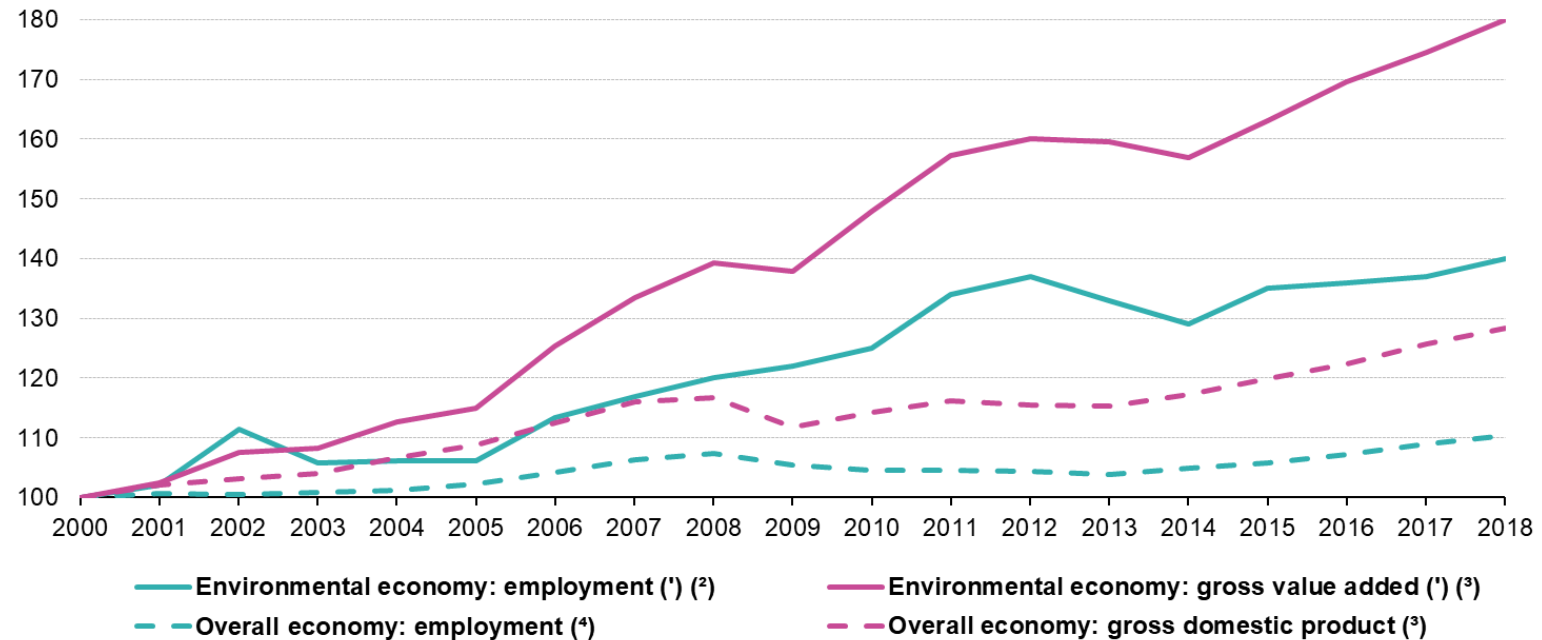
Green jobs and skills: Stylised facts

- Green employment grows at a fast pace. 3.1 million FTEs in 2000 to 4.4 million in 2018
- GE is more geographically concentrated compared to non-green jobs
- Fast-growing GE areas tend to be high-tech (as per R&D, patenting, etc)
- Environmental Regulation is only a weak driver of GE growth (in the short-term)
- GE has a strong multiplier effect: each new green job contributes to generate about 4.2 new non-tradable jobs in the local economy

(See among others Consoli et al 2015; Vona et al 2015; Vona et al 2016; Elliot and Lindley, 2017; Lee, 2017)

Green jobs and skills: Stylised facts

Development of key indicators for the environmental economy and the overall economy, EU-27, 2000–2018
(2000 = 100)



(1) Eurostat estimates

(2) In full-time equivalents

(3) Index compiled for chain-linked volumes data in EUR million (reference year 2010; at 2010 exchange rates)

(4) Thousand persons

Source: Eurostat (online data codes: nama_10_a10_e, nama_10_gdp, env_ac_egss1, env_ac_egss2)



Green jobs and skills: occupations

Greening the economy will affect skills needs in three ways (Cedefop, 2012):

- Structural changes lead to increased demand for some occupations and decreases for others. (e.g., Natural Sciences Managers; Chemical Engineers, etc.)
- New economic activity will create new occupations and there will be a need for new skills profiles and qualification and training frameworks. (e.g., Water Resource Specialists; Wind Energy Operations Managers, etc.)
- Many existing occupations and industries will experience greening changes to tasks within their jobs, and this will require adjustments to the current training and qualification frameworks for these occupations. (Civil Engineers; Soil and Plant Scientists, etc.)

Green jobs and skills: Stylised facts

- High-skill green jobs hold the largest share of GE increase
- Fast-growing GE areas tend to be high-tech (as per R&D, patenting, etc)

Occupational groups (2-digit Standard Occupational Classification)	Green employment share (2006)	Growth green employment share (2006-2014)	Average years of education of green employment	Average years of education of non-green employment
Management Occupations	0.0899	0.1538	15.50	15.32
Business and Financial Operations Occupations	0.0805	0.0295	14.95	15.28
Computer and Mathematical Occupations	0.0002	6.3806	15.57	15.38
Architecture and Engineering Occupations	0.2035	0.0783	15.94	15.43
Life, Physical, and Social Science Occupations	0.1465	0.1081	16.25	16.87
Community and Social Services Occupations	-	-	-	16.08
Legal Occupations	0.0002	0.0232	16.48	17.51
Education, Training, and Library Occupations	-	-	-	15.87
Arts, Design, Entertainment, Sports, and Media Occupations	0.0275	-0.0122	15.66	14.54
Healthcare Practitioners and Technical Occupations	0.0004	0.3669	14.83	15.62
Healthcare Support Occupations	-	-	-	12.69
Protective Service Occupations	-	-	-	12.32
Food Preparation and Serving Related Occupations	-	-	-	10.95
Building and Grounds Cleaning and Maintenance Occupations	-	-	-	11.45
Personal Care and Service Occupations	-	-	-	12.57
Sales and Related Occupations	0.0392	0.5460	13.99	12.38
Office and Administrative Support Occupations	0.0027	-0.1283	11.96	12.97
Farming, Fishing, and Forestry Occupations	-	-	-	11.06
Construction and Extraction Occupations	0.0699	-0.1653	12.13	11.95
Installation, Maintenance, and Repair Occupations	0.0986	0.0073	12.74	12.72
Production Occupations	0.0366	-0.2123	12.81	11.87
Transportation and Material Moving Occupations	0.0281	-0.0348	11.54	11.72

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Environmental Regulation and Green Skills Vona et al. 723

Table 3. Green General Skills Identified from O*NET

Engineering and technical:	
2C3b	Engineering and Technology
2C3c	Design
2C3d	Building and Construction
2C3e	Mechanical
4A3b2	Drafting, Laying Out, and Specifying Technical Devices, Parts, and Equipment
4A1b3	Estimating the Quantifiable Characteristics of Products, Events, or Information
Operation management:	
2B4g	Systems Analysis
2B4h	Systems Evaluation
4A2b3	Updating and Using Relevant Knowledge
4A4b6	Provide Consultation and Advice to Others
Monitoring:	
2C8b	Law and Government
4A2a3	Evaluating Information to Determine Compliance with Standards
Science:	
2C4b	Physics
2C4d	Biology

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Table 5

Profiling of green occupations: skill measures.

	(1) NR analytical	(2) NR interactive	(3) R cognitive	(4) R manual	(5) NR manual	(6) RTI index
Green emerging	0.0293 (0.0187)	-0.00737 (0.0205)	-0.0320 [*] (0.0192)	-0.0152 (0.0149)	-0.00291 (0.0364)	-0.0692 (0.0476)
Green enhanced skills	0.0297 [*] (0.0130)	0.00404 (0.0145)	-0.0198 [*] (0.0108)	-0.00508 (0.0155)	0.0152 (0.0162)	-0.0583 ^{**} (0.0269)
Joint sign. green occ dummies (F)	3.309 ^{**}	0.120	2.489 [*]	0.519	0.456	2.996 [*]
N	465	465	465	465	465	465

OLS estimates weighted by employment share. Robust standard errors in parenthesis.

^{*} $p < 0.1$.

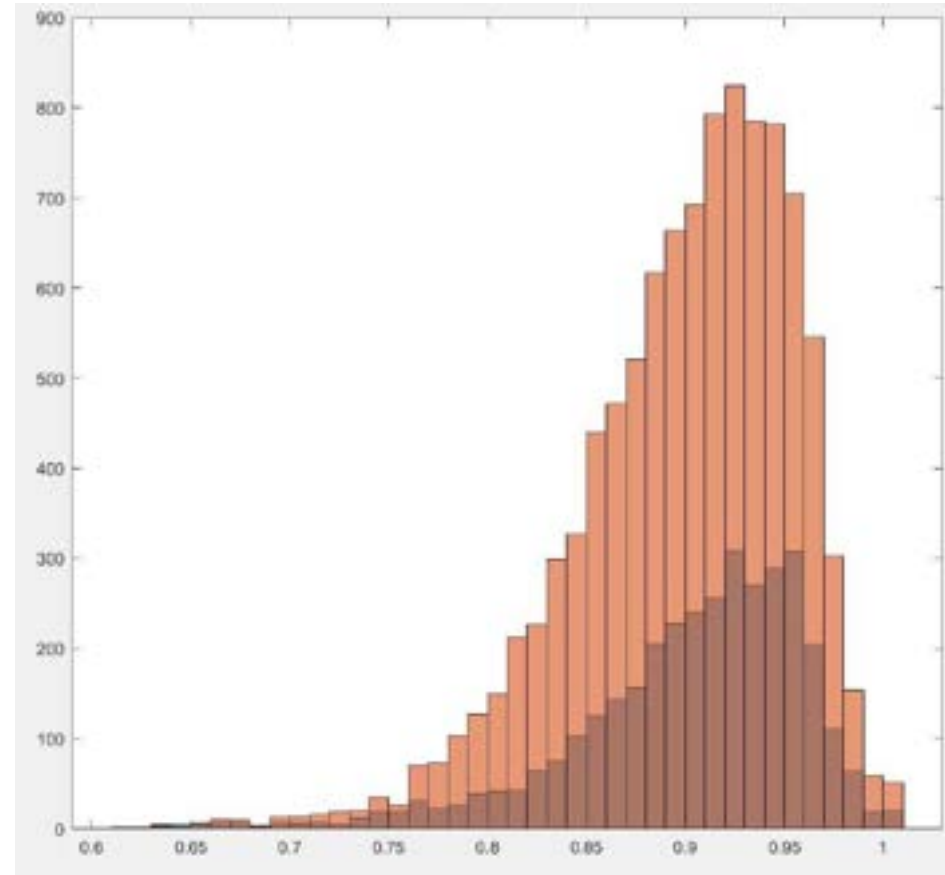
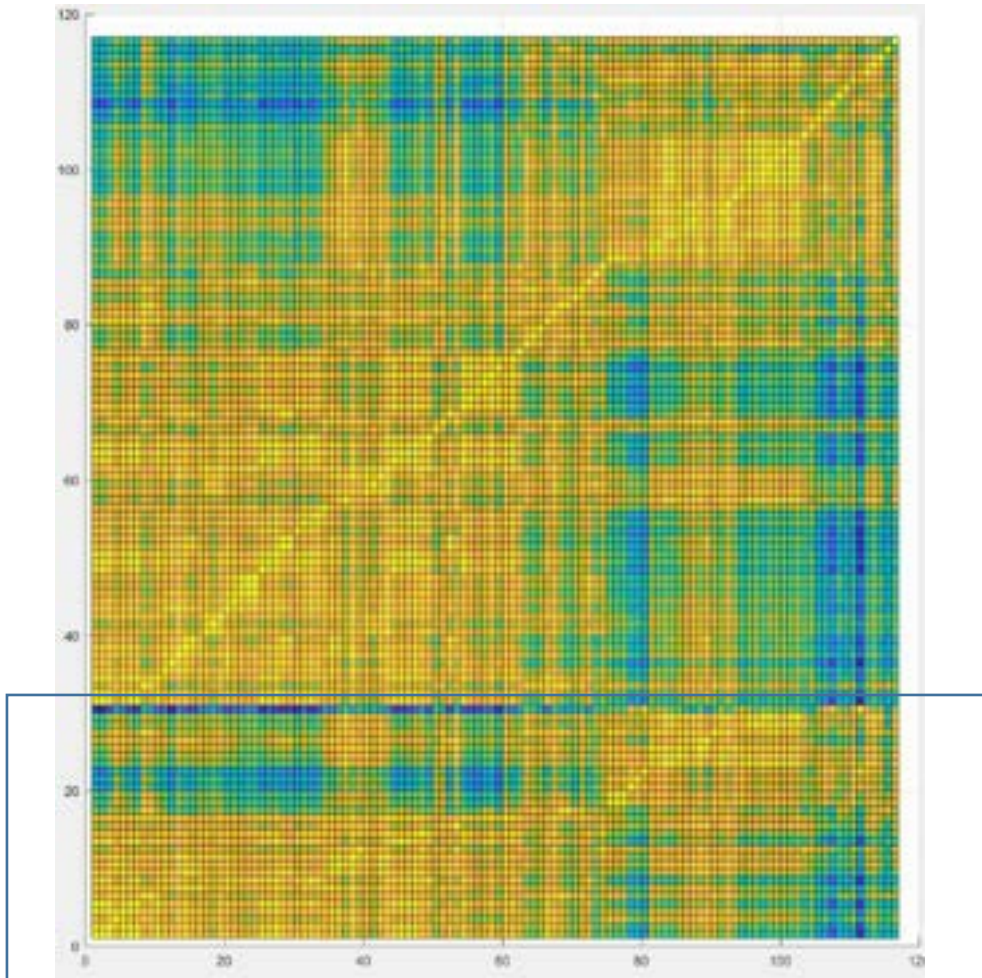
^{**} $p < 0.05$.

^{***} $p < 0.01$.

SOC 3-digit dummies included. Occupations in SOC 3-digit categories with no green occupation have been excluded.

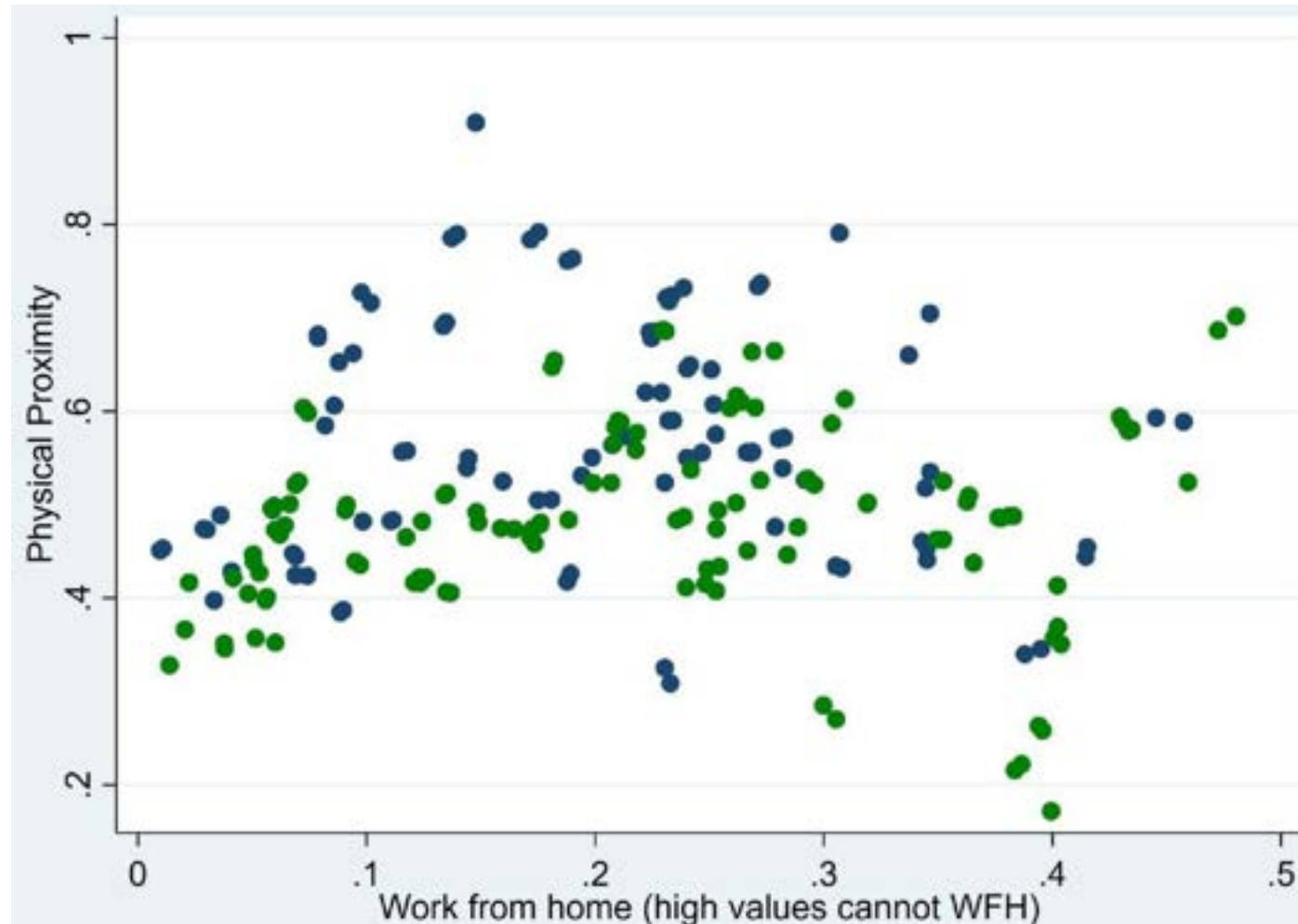
Green jobs and skills: Stylised facts

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Green jobs and skills: Stylised facts

- The green transition and the C-19 pandemic



Summing up

The green “immersion” will require huge innovative efforts:

- Technological transition threatens jobs and reinforces pressures on public budgets, but is vital for solving environmental issues
- Investments to train and educate high- medium-skill workers
- Possible inequalities may emerge (Barbieri et al., 2021)
- Environmental technologies require specific (scarce) skills to be developed and deployed → possible bottleneck for the sustainable transition

The challenge is to provide thought training and education the proper set of skills to: re-employ workers in brown industries, re-employ workers in brown occupations, provide workers for new occupations and activities

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COMPULSORY COURSES	ECTS	COMPULSORY COURSES	ECTS
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Economics of innovation	8	Energy and resource economics	7
Strategic control and performance management	8	Behavioral economics for the environment	7
Environmental law and intellectual property rights	8	International marketing and sustainability	9
Project appraisal and cost benefit analysis for the environment	7	ELECTIVE COURSES	
Statistics for economics and business	12	You have to choose one of the following courses:	
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		• Foreign Language	
		You have to choose 14 ECTS among of the following suggested courses:	
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		• Machine learning for quantitative economics (7 ECTS)	
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		• Development economics and emerging markets (7 ECTS)	
		• Organizational behavior and human resource management (7 ECTS)	
		• Financial management (7 ECTS)	
		• Project work (7 ECTS)	
		MASTER THESIS (research project and dissertation)	12

For further details visit the following page:

<http://www.unife.it/economia/lm.economics>

Green economy and sustainability is an international Master's degree for Italian and non-Italian students.

Foreign students are welcome and exchange programmes like Erasmus+ are strongly encouraged and supported.

Coming soon...

CEIS - Circular Economy Innovation & Skills

Partners:

- University of Ferrara - SEEDS - CERCIS
- Centoform srl
- ATHENA RC (Athena Research and innovation Center in Information, Communication and knowledge Technology – Sustainable development Unit
- Wuppertal Institute for Climate, Environment, Energy
- ANOIS
- AEVOLUTION – Circular materials innovation
- De-LAB srl Società Benefit

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Objectives:

- Provide training activities to reduce skill shortage for the circular economy
- Product, process, organisational assets and marketing the topics of: end-of-life, product restoration, self-sufficiency, new business models, etc.

Thank you for your attention

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