

Reskilling for a green transition

Dr. Florian Egli & Simon Schmid (skilllab)
With contributions from Felix Zaussinger
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- Transition to a green economy is disruptive
 - 11 million geographically concentrated workers in occupations that are likely negatively impacted.
- A just transition requires mitigating adverse effects
 - Because it is policy-driven (cf. backlash)
 - Requires supporting workers to move from declining to growing occupations.
- Transitioning workers will require up- and reskilling, furthering lifelong learning.
 - Planning these skilling and learning pathways requires understanding which occupations will be negatively impacted and where workers can transition to.
- In turn, enabling the transition requires satisfying the demand for workers in growing and emerging 'green' occupations
 - This requires an understanding of skills that are central and essential for green occupations

Apprenticeships are

- the only form of formalized on-the-job training,
- in some schemes combined with vocational education,
- aimed at school leavers and young adults, up to 29 years old.

Hence, apprenticeships should be used to

- equip young workers with future-proof green skills,
- whereby these green skills have to be defined and trainings designed

However, “apprenticeships 2.0” may be required to

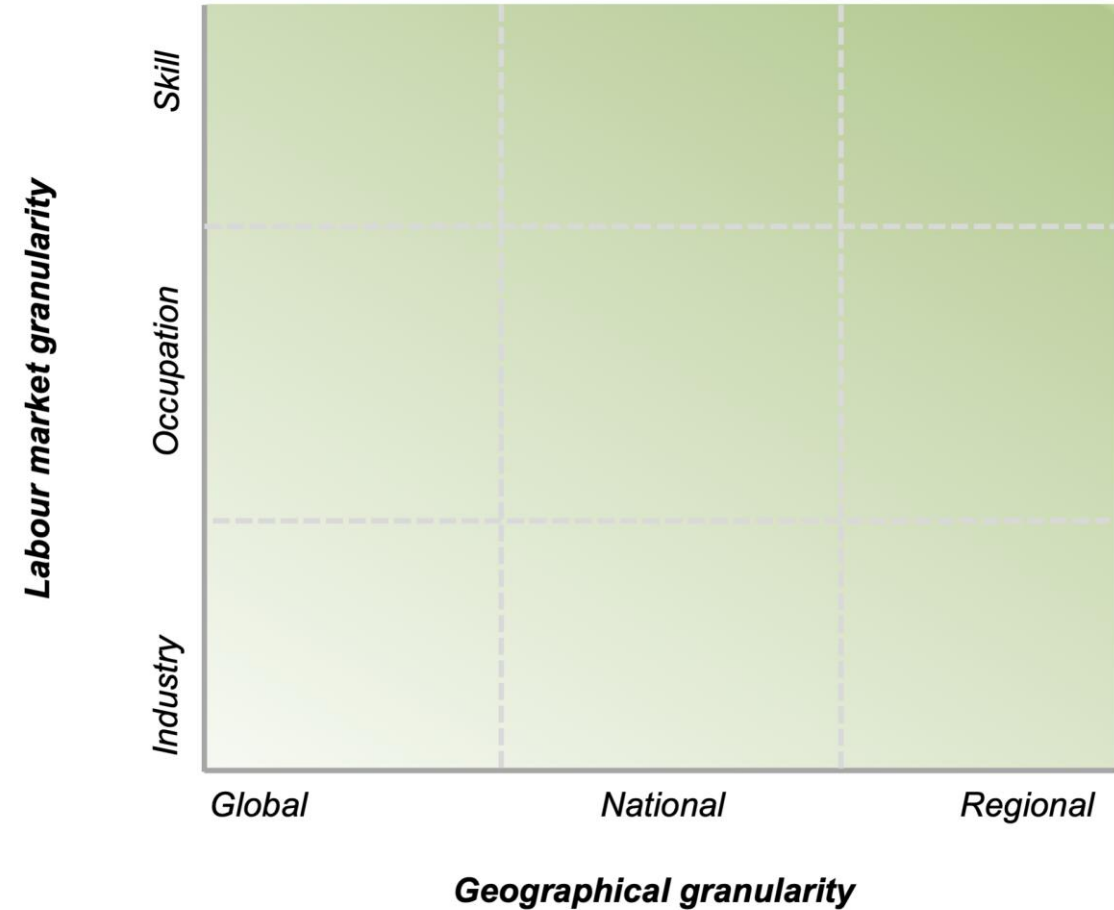
- transition workers in declining occupations (>50 years old)
- equip these workers with the central skills for a green economy

Currently, there is no formalized on-the-job training for these workers

- Up- and reskilling together with lifelong learning needed
- Which skills?
- Can it be formalized?

What do we need for policymaking?

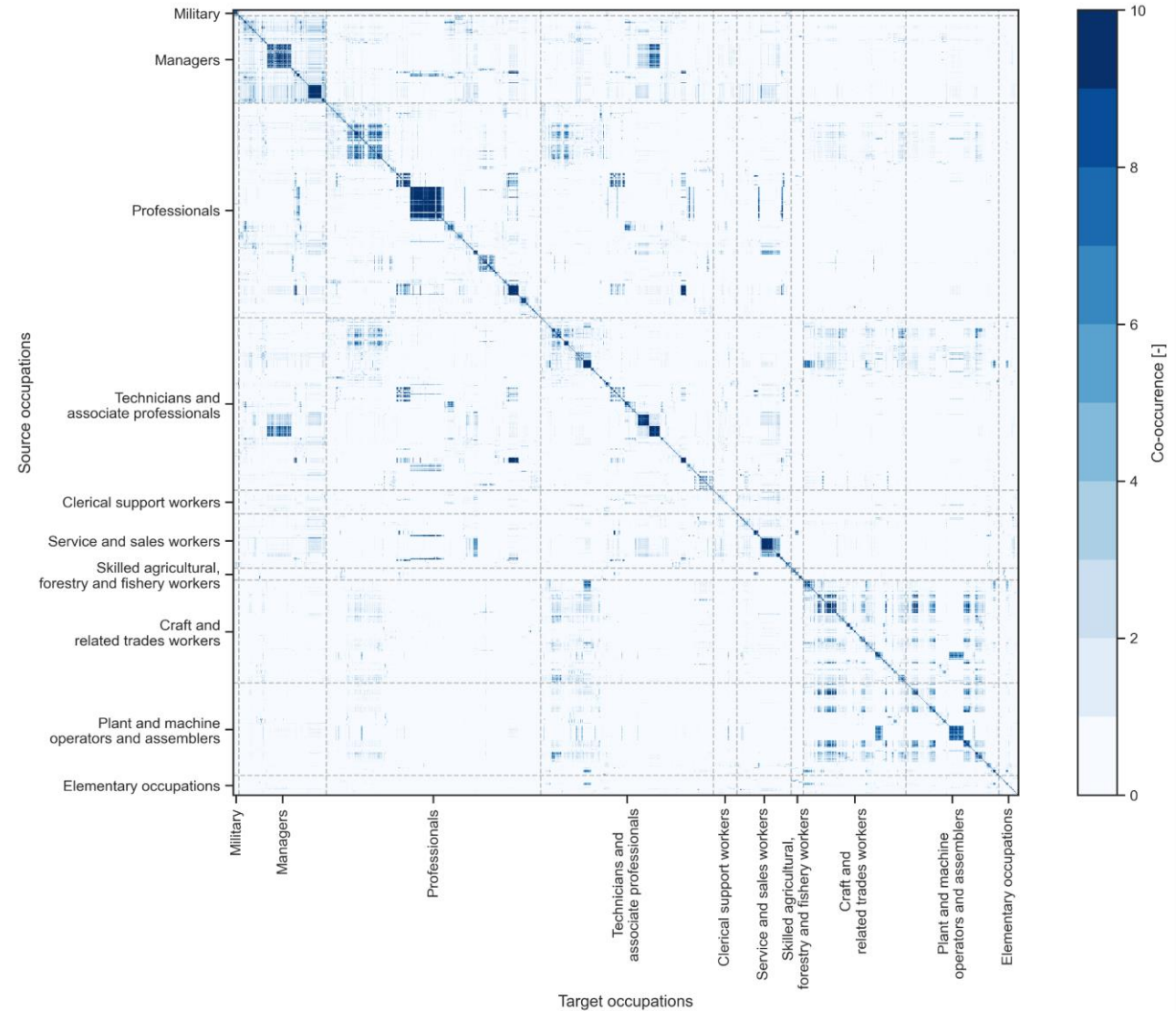
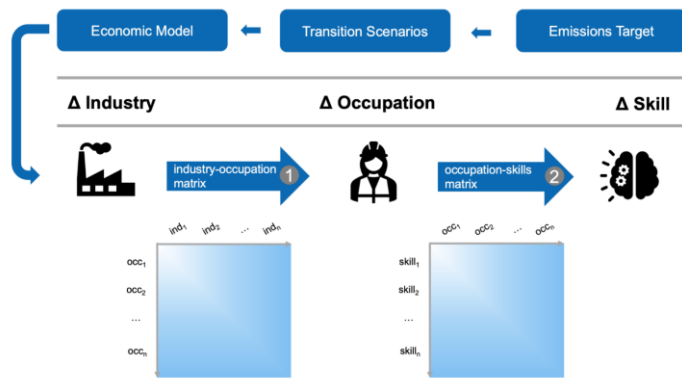
- Aggregate impacts not enough
- Granularity
 - Labour markets → skills determine likelihood of successful job transition
 - Geography → Large spatial variance of impacts, people hesitant to move



What is a skill (in the ESCO framework)?

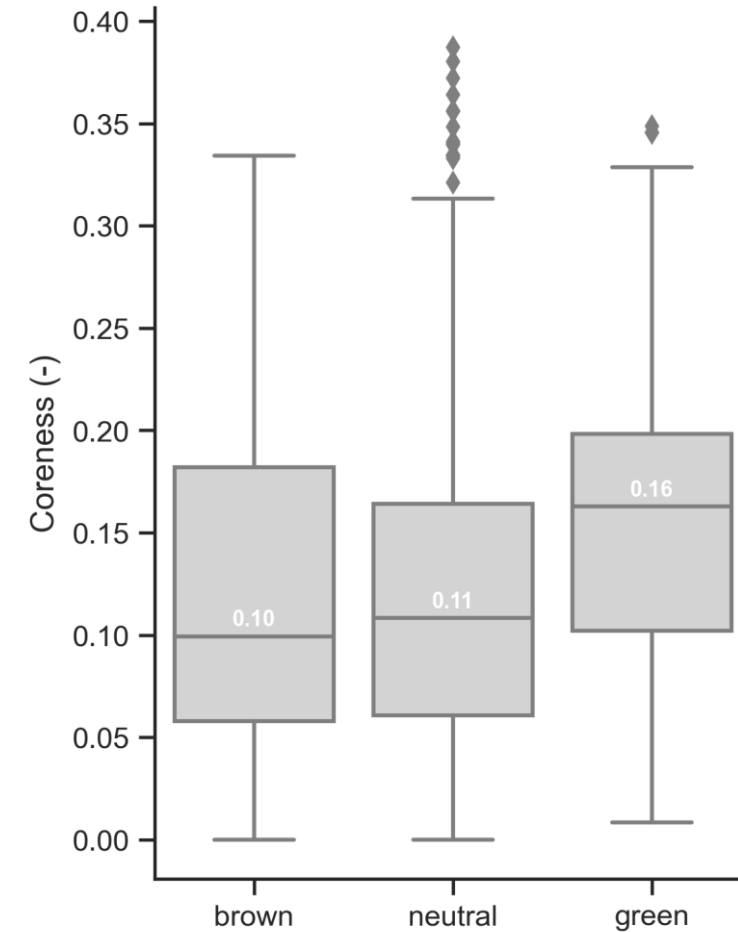
Component	Solar energy technician (ref)	Surface Miner (ref)
Essential skills	mount photovoltaic panels, transport construction supplies, interpret 2D plans, ... (15 more)	operate mining tools, drive vehicles, work ergonomically, ... (4 more)
Essential knowledge	electricity, mechanics, solar energy, electrical wiring plans	excavation techniques, impact of geological factors on mining operations
Optional skills	calculate solar panel orientation, estimate profitability, ... (15 more)	operate front loader, react to events in time-critical environments
Optional knowledge	building codes, types of photovoltaic panels, ... (2 more)	electricity, geology, mechanics

From high-level targets to skills

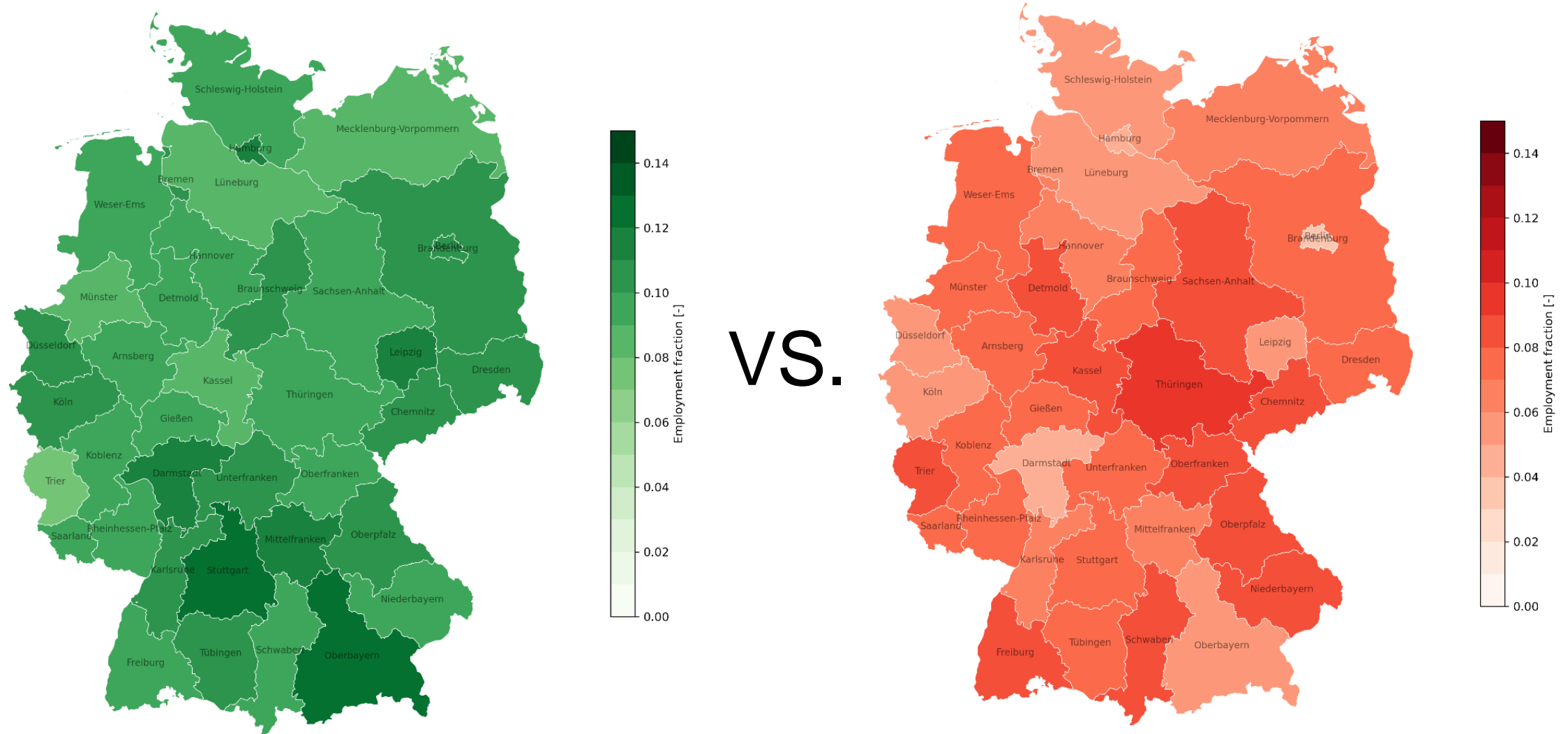


Occupational similarity via skills

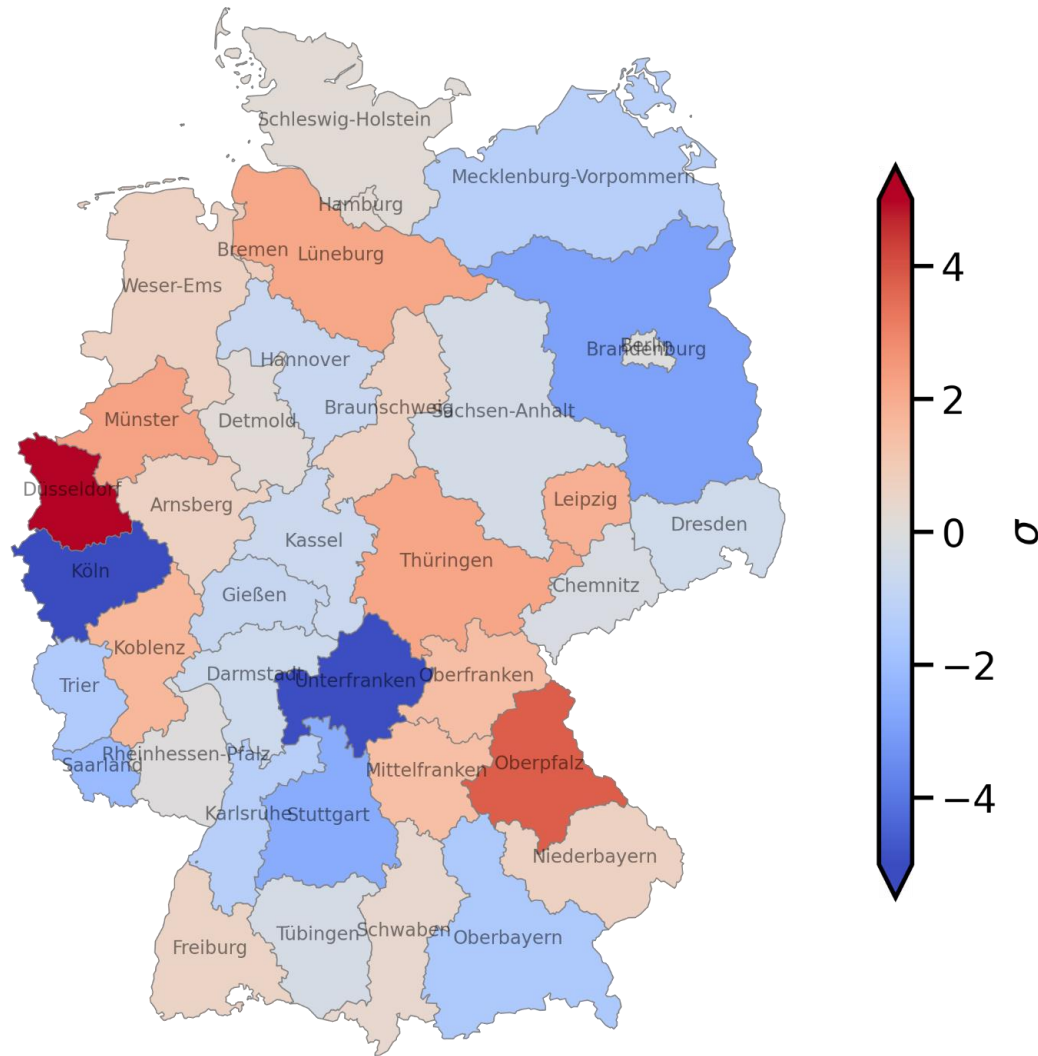
Category	Proxy	Demand	Example	Share (%)
Green	time a worker engages in environmentally friendly activities (% of „green“ tasks)	increasing	solar energy technician	13.8
Brown	industry pollution intensity	decreasing	petroleum pump system operator	13.5
Neutral	not green or brown	unchanged	shop assistant	72.8



Spatial variation: The example of Germany



Toward an “at-risk” metric for the transition



Take-aways

- Two dimensions of risk
 - Number of “brown” jobs
 - Coreness of “brown” jobs
- Composed index to identify regions at-risk
- Possible to extend to all of EU

Data / evidence

- Lack of robust data intersections, e.g. from ILO sectors (fossil fuel electricity generation vs. renewable electricity generation) to ISIC/NACE industries (electric power generation, T&D)
- Lack of knowledge about green transition impacts on occupation level (e.g. at ISCO-08 3- or 4-digit)
 - Plant and machine operators and assemblers
 - 81 Stationary plant and machine operators
 - 811 Mining and mineral processing plant operators
- Lack of knowledge about past job transitions
- Lack of quantitative green transition forecasts (cf. cedefop skill forecast)

Policymaking

- Aggregate numbers may hide regional disparities and bottlenecks
- Data-driven/evidence-based understanding of the role of skills
- Formalized up- and re-skilling

- Design formalized green up- and re-skilling based on current apprenticeship forms
- Launch EU-wide effort to model granular (skills, regional) green transition impacts
- Harmonize statistical units across models and standardised classifications (e.g. industries, occupations)
- Partner with third-party data providers to get real-time data on skill profiles (surveys), job transitions and job ads
- Adapt just transition programs regionally, no one-size-fits-all

Thank you very much for you attention!

Dr. Florian Egli
Senior Researcher
florian.egli@gess.ethz.ch
@floegli

Simon Schmid
Public Sector & Key Accounts
s.Schmid@skilllab.io

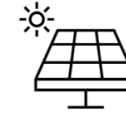
Annex: Coreness examples for two occupations

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Surface miner

Skill	Reuse	Score
troubleshoot	SS	0.55
work ergonomically	CS	0.38
address problems critically	CS	0.34
drive vehicles	CS	0.16
...
Coreness: mean		0.19
Coreness: median		0.12



Solar energy technician

Skill	Reuse	Score
mechanics	CS	0.55
monitor stock level	SS	0.47
work ergonomically	CS	0.38
electricity	CS	0.38
...
Coreness: mean		0.16
Coreness: median		0.14

Note: The column *Skill* refers to essential ESCO skill and knowledge items. The reuse level codes in column *Reuse* are: CS = cross-sector, SS = sector-specific. The coreness values in column *Score* are calculated by taking into account properties of the underlying skills network following Kandera et al. 2020: betweenness centrality, eigenvector centrality and the clustering coefficient.

Annex: Green transition scenarios

Scenario	Scope	Model	Emission pathway	Labour market granularity	Geographical granularity	Sources
ILO (Energy Sustainability and Circular Economy)	Global	Multi-regional input-output model EXIOBASE v3 (incl. second-order effects)	2°C vs 6°C by 2030 (IEA Energy Technology Perspectives)	163 industries, 84 occupations (ISCO-08 2-digit)	44 countries	ILO 2018, Montt et al., 2018, Wiebe et al. 2019, ILO 2019, IEA 2015
IEA (NZE 2050)	Global	IEA World Energy Outlook + Energy Technology Perspectives	Net-zero emissions by 2050	88 occupations (ESCO) through manual mapping	Global	IEA 2021
Greenness metric	Quasi-global (US data)	None (Static)	None	2942 occupations (ESCO) coded as green, brown or neutral	Global	O*NET 2010, Vona et al. 2018