

**PŘÍLOHA Č. 6**  
projektu VUS4\_01\_VÚBP

## **Bezpečnost a ochrana zdraví při práci v oblasti rostoucí zelené ekonomiky**

### **Rešerše zdrojů**



**2019**

**OBSAH**

|  |           |
|--|-----------|
| <b>TÉMA: ZELENÁ EKONOMIKA A BOZP .....</b>                         | <b>3</b>  |
| <b>ZDROJE DOSTUPNÉ V ODBORNÉ KNIHOVNĚ VÚBP, V. V. I.....</b>       | <b>3</b>  |
| <b>VOLNĚ DOSTUPNÉ ZDROJE – ČESKÉ.....</b>                          | <b>8</b>  |
| <b>VOLNĚ DOSTUPNÉ ZDROJE – ZAHRANIČNÍ.....</b>                     | <b>9</b>  |
| <b>OSTATNÍ.....</b>  | <b>11</b> |
| <b>ODBORNÁ LITERATURA BEZ PŘÍSTUPU K PLNÉMU TEXTU.....</b>         | <b>18</b> |
| <b>TÉMA: ZELENÁ EKONOMIKA A BOZP – TEMATICKÉ ROZŠÍŘENÍ.....</b>    | <b>32</b> |
| <b>ZDROJE DOSTUPNÉ V ODBORNÉ KNIHOVNĚ VÚBP, V. V. I.....</b>       | <b>33</b> |
| <b>VOLNĚ DOSTUPNÉ ZDROJE – ČESKÉ.....</b>                          | <b>36</b> |
| <b>VOLNĚ DOSTUPNÉ ZDROJE – ZAHRANIČNÍ.....</b>                     | <b>37</b> |
| <b>ODBORNÁ LITERATURA BEZ PŘÍSTUPU K PLNÉMU TEXTU (EBSCO).....</b> | <b>44</b> |

**TÉMA: ZELENÁ EKONOMIKA A BOZP**

Rešerše je zpracovaná pro potřeby přípravy nového výzkumného projektu „Bezpečnost a ochrana zdraví při práci v oblasti rostoucí zelené ekonomiky“ do programu BETA 2 Technologické agentury ČR.

**Klíčová slova v ČJ:** bezpečnost a ochrana zdraví při práci, BOZP, zelená ekonomika, zelená pracovní místa

**Klíčová slova v AJ:** occupational safety and health, OSH, green economy, green jobs

**Jazykové omezení:** český, anglický, německý

**Časové omezení:** bez omezení, aktualizace 2019

**Obsah:**

- Zdroje dostupné v odborné knihovně VÚBP, v. v. i .
- Volně dostupné zdroje – české
- Volně dostupné zdroje – zahraniční
- Odborná literatura bez přístupu k plnému textu

**ZDROJE DOSTUPNÉ V ODBORNÉ KNIHOVNĚ VÚBP, V. V. I.**

**ASHKIN, S. P. Green housekeeping: creating a cleaner, safer, healthier indoor environment. *Industry and Environment*. 1998, č. 3, s. 25-27.**

Kvalita ovzduší uvnitř budov: vhodný výběr čisticích prostředků může ovlivnit nejen bezpečnost a zdraví zaměstnanců závodů, ale i zvýšit produktivitu práce. Program "Zelené hospodaření", který je prováděn u firmy Searle/Monsanto ve státě Illinois (USA). Přístupy a postupy vedení závodu, školení personálu a výsledky, kterých se dosáhlo.

- ovzduší - úklid - prostředky - čistota - prostory vnitřní - čištění – programy

**BELLO, Deidre. Integrating worker safety into green jobs : what influence will green jobs have on worker safety and health, the safety professional, and personal protective equipment? *Safety and Health*. 2010, roč. 181, č. 8, s. 36-41.**

Zelená zaměstnání jsou definována jako ta, která jsou zapojena do ekonomických aktivit, které pomáhají chránit či obnovovat životní prostředí a zachovávat přírodní zdroje. Toto "zelené hnutí" se stává stále populárnější a státní agentury pokračují v přidělování financí na podporu zelených zaměstnání a dalších projektů zaměřených na trvale udržitelný rozvoj. Odborníci však varují, že bezpečnost a ochrana zdraví pracovníků by se v kontextu těchto snah neměla stát okrajovou záležitostí. BOZP by měla být do těchto projektů integrována tak, aby se předcházelo nežádoucím následkům. Tyto ekologické snahy mají také vliv na design osobních ochranných prostředků.

- BOZP - ekologie - rozvoj trvale udržitelný - zaměstnání - projekty - OOPP

**Bezpečnost' a ochrana zdravia zamestnancov ekologických pracovných miest. *Inovace*. 2016, roč. 22, č. 3-4. s. 48.**

Ochrana životního prostředí s sebou přinesla vznik ekologických pracovních míst. Co jsou ekologická pracovní místa a jaké jsou na ně kladené nároky z hlediska bezpečnosti a ochrany zdraví pracovníků?

- místa pracovní zelená - bezpečnost práce - ochrana zdraví - ochrana zaměstnanců

**BORTOLINI, Lucia ...[et al.]. Urban green spaces activities : a preparatory groundwork for a safety management systém. *Journal of Safety Research*. 2016, vol. 56, s. 75-82.**

Práce a údržba městských zelených ploch jsou vysoce rizikové činnosti a obvykle představují možné zdroje zranění. Otázky řízení jsou složité a jsou silně ovlivňovány politikami společností z hlediska řízení bezpečnosti a lidského faktoru. Profesionální zahradníci musí čelit vysokému počtu úkolů, včetně ochrany veřejného zdraví a bezpečnosti a bezpečných pracovních postupů. Tento příspěvek poskytuje přípravné základy pro modelování a popis skutečných úrovní rizika během uvedených činností. Metodika představuje užitečný nástroj pro rozhodování jak pro vedoucí skupiny, tak pro koordinátory bezpečnosti.

- plochy zelené - parky - zahradníci - údržba zeleně - úrazy pracovní - rizika pracovní - řízení rizik - řízení bezpečnosti práce - systémy řízení

**BOUDRA, Leila ...[et al.]. Prendre en compte le territoire dans la prévention des risques professionnels. *Le travail humain*. 2019, roč. 82, č. 2, s. 99-128.**

Otázky udržitelnosti životního prostředí vedou ke vzniku nových hospodářských odvětví ("zelené podnikání"), které představují nové příležitosti pro prevenci pracovních rizik, a přispívají tak současně ke třem pilířům udržitelného rozvoje (hospodářskému, environmentálnímu a sociálnímu). V této souvislosti provedli autoři výzkum prevence pracovních rizik v pěti střediscích třídění odpadu, což vedlo k pochybnostem o vazbách mezi územím/teritoriím, prací a prevencí. Výsledky skutečně ukazují, že území je strukturálním prvkem třídění, protože odpad je teritorializovaný objekt. Poté jsou kladeny důležité otázky týkající se soudržnosti mezi nakládáním s odpady do území a pracovními podmínkami ve středisku třídění odpadů a možností zachování takové soudržnosti v průběhu času. V tomto článku jsou identifikovány a diskutovány dva směry prevence. V závěru jsou rozebírány dva aspekty: pojem území a jeho definice v perspektivě orientované na zaměstnance a zvažování územního rozměru pro prevenci pracovních rizik.

- území - prostory pracovní - rizika pracovní - prevence rizik - ekonomika zelená - recyklace - odpady - třídiřny

**BOZP a ekologické pracovní místa. *Bezpečná práce*. 2017, roč. 48, č. 4, s. 44.**

Informace převzatá z EU-OSHA o tom, co jsou zelená (ekologická) pracovní místa, proč je důležité zohledňovat BOZP na těchto nových pracovištích a jaké jsou v uvedených souvislostech úkoly Agentury.

- rizika nová - BOZP - místa pracovní zelená - EU-OSHA

**EU-OSHA Explores OSH Risks Associated With Green Jobs. *Professional Safety*. 2013, Vol. 58, Issue 6, s. 27.**

The article discusses the "Green Jobs and Occupational Safety and Health: Foresight on New and Emerging Risks Associated With New Technologies by 2020" report from the European Agency for Safety and Health at Work.

**KORDOŠOVÁ, Miroslava. *Bezpečnost' a ochrana zdravia pri práci a aspekty zelenej ekonomiky: 1. časť. Bezpečná práce*. 2015, roč. 46, č. 5, s. 43-45.**

Zelená pracovní místa a nová rizika jsou aktuálním tématem 21. století. Úvod k sérii článků na téma zelených pracovních míst a zelené ekonomiky s přehledem devíti principů zelené ekonomiky.

- BOZP - místa pracovní zelená - ekonomika zelená - technologie - rizika nová - green jobs - green technologies - prostředí životní – zaměstnanci

**KORDOŠOVÁ, Miroslava. *Bezpečnost' a ochrana zdravia pri práci a aspekty zelenej ekonomiky: 2. časť. Bezpečná práce*. 2016, roč. 47, č. 1, s. 38-45.**

Problematika BOZP u vybraných obnovitelných zdrojů energie. V centru pozornosti autorky jsou větrná energie a solární energie.

- BOZP - místa pracovní zelená - ekonomika zelená - technologie - rizika nová - green jobs - green technologies – zdroje obnovitelné – energie obnovitelná – energie sluneční – energie větrná

**KORDOŠOVÁ, Miroslava. *Bezpečnost' a ochrana zdravia pri práci a aspekty zelenej ekonomiky: 3. časť. Bezpečná práce*. 2016, roč. 47, č. 2, s. 43-47.**

Seriál k problematice BOZP u vybraných obnovitelných zdrojů energie pokračuje třetí částí. Ta je věnovaná BOZP v odpadovém hospodářství.

- BOZP - místa pracovní zelená - ekonomika zelená - technologie - rizika nová - green jobs - green technologies - hospodářství odpadové - odpady - faktory biologické

**KORDOŠOVÁ, Miroslava. *Bezpečnost' a ochrana zdravia pri práci a aspekty zelenej ekonomiky: 4. časť. Bezpečná práce*. 2016, roč. 47, č. 3, s. 16-21.**

Čtvrtá část série o problematice BOZP u vybraných obnovitelných zdrojů se zabývá BOZP při zpracování biomasy a dřevního odpadu.

- BOZP - místa pracovní zelená - ekonomika zelená - technologie - rizika nová - green jobs - green technologies - biomasa - prach dřevný – odpady

**KORDOŠOVÁ, Miroslava. Bezpečnosť a ochrana zdravia pri práci a aspekty zelenej ekonomiky: 5. časť. Bezpečná práca. 2016, roč. 47, č. 4, s. 40-45.**

Pátý díl série o problematice BOZP u vybraných obnovitelných zdrojů se věnuje BOZP v souvislosti s čištěním odpadních vod.

- BOZP - místa pracovní zelená - ekonomika zelená - technologie - rizika nová - green jobs - green technologies - vody odpadní - čištění - čistírny odpadních vod

**KORDOŠOVÁ, Miroslava. Bezpečnosť a ochrana zdravia pri práci a aspekty zelenej ekonomiky: 6. časť. Bezpečná práca. 2016, roč. 47, č. 5, s. 41-45.**

Díl s názvem "BOZP a čištění odpadních vod" je pokračováním 5. dílu seriálu, publikovaného v č. 4/2016. Věnuje se biologickým, chemickým, fyzikálním a psychosociálním faktorům, s nimiž se lze setkat v prostředí a prostorech určených pro čištění odpadních vod.

- BOZP - místa pracovní zelená - ekonomika zelená - technologie - rizika nová - green jobs - green technologies - vody odpadní - čištění - čistírny odpadních vod - prostředí pracovní - nebezpečí - faktory rizikové

**KORDOŠOVÁ, Miroslava. Bezpečnosť a ochrana zdravia pri práci a aspekty zelenej ekonomiky: 7. časť. Bezpečná práca. 2017, roč. 48, č. 1, s. 36, 38-39 a 41-45.**

Další díl věnovaný BOZP a čištění odpadních vod je pokračováním pátého a šestého dílu seriálu, otištěných v časopise Bezpečná práca č. 4/2016 a 5/2016, a zároveň uzavírá celou sérii věnovanou BOZP v sektoru zelené ekonomiky. Věnuje se povinnostem zaměstnanců a zaměstnavatelů při práci v zařízeních čištění odpadů a poskytuje zaměstnavatelům doporučení na zlepšení pracovních podmínek a pro předcházení pracovním úrazům a nemocem z povolání při čištění odpadních vod.

- BOZP - místa pracovní zelená - ekonomika zelená - technologie - rizika nová - green jobs - green technologies - vody odpadní - čištění - čistírny odpadních vod - prostředí pracovní - zaměstnanci - zaměstnavatelé - povinnosti - doporučení - opatření - vzory

**Making Green Jobs Safer for Employee. Professional Safety. 2012, Vol. 57, Issue 1, s. 19.**

The article reports on recommendations for improving green jobs safety developed at a workshop held by the U. S. National Institute for Occupational Safety & Health (NIOSH) and the U. S. Centers for Disease Control & Prevention (CDC), including data collection, worker training, and market research.

**MARKOVÁ, Iveta. Nové a vznikající riziká ekologických pracovních míst. *Spektrum*. 2015, roč. 15, č. 1, s. 22-24.**

Autorka věnuje pozornost problematice hodnocení rizik ekologických pracovních míst (green jobs) z hlediska bezpečnosti a ochrany zdraví při práci. Zabývá se současným chápáním pojmu "ekologická pracovní místa" a popisuje pohled EU prezentovaný Evropskou agenturou pro BOZP (EU-OSHA) na BOZP na těchto pracovištích. Jelikož se předpokládá rozvoj tzv. "green technologies", buduje EU už dnes předpokládané scénáře rizik spojených s těmito technologiemi.

- BOZP - místa pracovní - technologie - rizika - rizika nová - green jobs - green technologies - ekologie

**TAUBITZ, Michael A. Lean, green and safe: integrating safety into the lean, green and sustainability movement. *Professional Safety*. 2010, roč. 55, č. 5, s. 39-46: obr., fotogr.**

V dnešním ekologicky zaměřeném obchodním světě je nutné pozastavit se nad otázkou, kam patří diskuse o zeštíhlené, zelené a udržitelné bezpečnosti. Autor vysvětluje, proč odborníci na bezpečnost práce potřebují dokázat, že mohou mísit obory, vytvářet praktické modely a provádět taktické kroky vedoucí k integrované strategii bezpečnosti práce. Autor tvrdí, že zeštíhlení v kancelářských a obchodních systémech může pomoci motivovat ke změně podnikové kultury, resp. kultury bezpečnosti práce.

- kultura bezpečnosti - kultura podniková - management - systémy integrované - ekologie - rozvoj trvale udržitelný

**TRÁVNÍČEK, Petr; KOTEK, Luboš. Risks associated with the production of biogas in Europe. *Process Safety Progress*. 2015, roč. 34, č. 2, s. 172-178 : tab., obr., fotogr.**

Tento článek popisuje problémy a rizika spojená s výrobou bioplynu z převážně zemědělských odpadů. Výroba bioplynu je v Evropě stále rozšířenější a počet nehod v těchto továrnách, a to jak ve velkých podnicích, tak i malých, se zvyšuje. Nedávná zkušenost s takovou nehodou je v článku shrnuta. Ve srovnání s petrochemickým průmyslem hladiny poškození ve výrobě bioplynu jsou nízké, ale přesto si zaslouží zvýšenou úroveň uplatnění moderní bezpečnosti a metodiky k analýze a hodnocení rizik.

bioplyny - biopaliva - rizika - analýzy rizik - hodnocení rizik - Evropa

**VALA, Jiří. Bezpečnost práce spojená se zelenými pracovními místy. *Bezpečnost a hygiena práce*. 2015, roč. 65, č. 12, s. 20-27.**

Autor upozorňuje na některá úskalí související s tzv. zelenými pracovními místy v kontextu s bezpečností a ochranou zdraví zaměstnanců. Co je šetrné pro přírodu, nemusí být šetrné pro zdraví zaměstnanců, a zelená pracovní místa mohou být místy specifických a mnohdy i nových pracovních rizik.

- místa pracovní zelená - green jobs - rizika pracovní - rizika nová - energetika - recyklace - biopaliva - izolace tepelné - pády z výšky - pády do hloubky

## **VOLNĚ DOSTUPNÉ ZDROJE – ČESKÉ**

**Evropská agentura pro bezpečnost a ochranu zdraví při práci. *Bezpečnost a ochrana zdraví pracovníků na zelených pracovních místech* [online]. EU-OSHA, c2017[cit. 2017-08-29]. Dostupný z: <https://osha.europa.eu/cs/emerging-risks/green-jobs>.**

EU se intenzivně snaží o dosažení rovnováhy mezi hospodářským růstem a potřebou chránit životní prostředí a vytyčila si náročné cíle pro snížení emisí skleníkových plynů, zvýšení energetické účinnosti, podporu obnovitelné energie a snížení množství odpadu. Díky tomu vznikla rozsáhlá řada zelených pracovních míst – pracovních míst, která přispívají k ochraně životního prostředí nebo k jeho návratu do původního stavu. Pokud však tato pracovní místa mají být skutečně udržitelná, musíme zajistit, aby poskytovala bezpečné, zdravé a důstojné pracovní podmínky. Zelená pracovní místa musí být dobrá pro pracovníky i pro životní prostředí.

**KAREN, Jiří. Nový zelený úděl pro Evropu: Najdeme odvahu prosadit přežití? *A2larm* [online]. 02. 09. 19 [cit. 2020-01-27]. Dostupný z:**

<https://a2larm.cz/2019/09/novy-zeleny-udel-pro-evropu-najdeme-odvahu-prosadit-preziti/>.

Radikální a ambiciózní Nový zelený úděl pro Evropu chce od základů změnit naši politiku. Komplexní program Nový zelený úděl pro Evropu (Green New Deal for Europe), pokoušející se nabídnout řešení krize, je dílem řady odborníků široké panevropské koalice hnutí a organizací, v němž důležitou roli hraje mezinárodní politické hnutí Democracy in Europe Movement 2025 (DiEM25).

**KORDOŠOVÁ, Miroslava; GALBIČKOVÁ, Blanka. *Bezpečnost' a ochrana zdravia pri práci a zelené pracovné miesta (zelená ekonomika): správa z VÚ č. 2343* [online]. Bratislava: Inštitút pre výskum práce a rodiny, december 2014 [cit. 2017-08-29]. Dostupný z:**

[http://www.ceit.sk/IVPR/images/IVPR/vyskum/2014/Kordosova/vu\\_2343\\_kordosova.pdf](http://www.ceit.sk/IVPR/images/IVPR/vyskum/2014/Kordosova/vu_2343_kordosova.pdf).

Predkladaná správa z výskumnej úlohy 2343 obsahuje analýzu princípov zelenej ekonomiky a dopadov technológií šetriacich životné prostredie na pracovné podmienky a BOZP zamestnancov pracujúcich v ekologických prevádzkach. Analyzuje pracovné podmienky, nebezpečenstvo a riziká pri práci zamestnancov v prevádzkach čistiarní odpadových vôd. Obsahuje hlavné povinnosti zamestnávateľov a odporúčania na zlepšenie pracovných podmienok zamestnancov ČOV.

- KS: bezpečnosť a ochrana zdravia pri práci, zelená ekonomika, zelené pracovné miesta, faktory pracovného prostredia, povinnosti zamestnávateľa

## VOLNĚ DOSTUPNÉ ZDROJE – ZAHRANIČNÍ

### EU-OSHA

**European Agency for Safety and Health at Work. *Green Jobs, new risks?: new and emerging risks to occupational safety and health in the electricity sector* [online]. Luxembourg: Publications Office of the European Union, 2014 [cit. 2017-08-29]. Dostupný z:**

<https://osha.europa.eu/en/tools-and-publications/publications/reports/green-jobs-new-risks-new-and-emerging-risks-to-occupational-safety-and-health-in-the-electricity-sector/view>.

This report describes a workshop, based on the EU-OSHA Foresight project, held in Brussels on 20 March 2014 for the European Sectoral Social Dialogue Committee (SSDC) Electricity. The objectives were: 1. To engage in a discussion on new and emerging risks in the electricity sector with the members of the SSDC Electricity building on the EU-OSHA Foresight project; 2. To stimulate their interest in the findings of the project relevant to their sector; and 3. To demonstrate how scenarios can be used to anticipate new and emerging risks and to explore policy options to address these.

**European Agency for Safety and Health at Work. *Green jobs and occupational safety and health: foresight on new and emerging risks associated with new technologies by 2020: report* [online]. Luxembourg: Publications Office of the European Union, 2013 [cit. 2017-08-29]. Dostupný z:**

[https://osha.europa.eu/en/node/6717/file\\_view](https://osha.europa.eu/en/node/6717/file_view).

This report describes the project 'Foresight of new and emerging risks to occupational safety and health associated with new technologies in green jobs by 2020', carried out for the European Agency for Safety and Health at Work (EU-OSHA). The outcome of the exercise is a set of scenarios covering a range of new technologies in green jobs

and the impact they could have on workers' health and safety. They are intended to inform EU policymakers, Member States' governments, and trade unions and employers, so that they can take decisions to shape the future of occupational safety and health (OSH) in green jobs towards safer and healthier workplaces.

**European Agency for Safety and Health at Work. *Occupational safety and health in the wind energy sector: European Risk Observatory Report* [online]. Luxembourg: Publications Office of the European Union, 2013 [cit. 2017-08-29]. Dostupný z: <https://osha.europa.eu/en/tools-and-publications/occupational-safety-and-health-in-the-wind-energy-sector>.**

This review considers the OSH issues in the wind energy sector, both onshore and offshore, within the EU Member States. The activities associated with wind energy — from the design and manufacturing of wind turbine parts, through the transport, installation and maintenance, to emergency rescue and waste treatment — are explored. OSH issues associated with working in remote areas, extreme weather conditions, confined spaces, awkward postures, electrical risks, falls from height, musculoskeletal disorders, physical and psychosocial loads, various aspects of work organisation and exposure to dangerous substances (e.g. at the production stage but also during maintenance operations) are included. Other aspects, such as subcontracted work, worker training and characteristics of the workforce (e.g. gender, age), are also addressed where relevant. Further, the possible conflicts between OSH and environmental requirements are explored.

## ILO

***Promoting safety and health in a green economy* [online]. International Labour Office, 2012 [cit. 2017-10-12] Dostupný z: [http://www.ilo.org/wcmsp5/groups/public/--ed\\_protect/--protrav/---safework/documents/publication/wcms\\_175600.pdf](http://www.ilo.org/wcmsp5/groups/public/--ed_protect/--protrav/---safework/documents/publication/wcms_175600.pdf). ISBN 978-92-2-126096-7.**

The report looks at different “green industries” from an OSH perspective, and shows that while green jobs improve the environment, revitalize the economy and create new employment opportunities, they may also present a number of known and unknown risks for workers. The greening of traditional sectors which will continue to provide the bulk of all employment and harbour most occupational safety and health risks can provide a major opportunity to make them safer and healthier, as well as energy efficient and environmentally sustainable, provided the right measures are taken.

According to the ILO report, “a true green job must integrate safety and health into design, procurement, operations, maintenance sourcing, use and recycling”. OSH mechanisms need to integrate the greening process into their policies and programmes of action. Policy changes are necessary to support approaches such as “prevention through design” in creating green jobs. Social dialogue among representatives of government, workers and employers is central to the prevention and management of occupational hazards and risks.

SafeWork has prepared this report to serve as a background to the theme for the World Day for Safety and Health at Work campaign in 2012.

***Safety and health at the heart of the future of work* [online]. International Labour Organization, 2019 [cit. 2020-01-27]. Dostupný z:**

[https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/documents/publication/wcms\\_686645.pdf](https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/documents/publication/wcms_686645.pdf). ISBN: 978-92-2-133152-0.

As the ILO celebrates its centenary, the first chapter of this report takes a look back on the evolution of these understandings over the past century and the ILO's role in its development since it was founded in 1919. Against the backdrop of the challenge of safety and health at work, the second chapter of the report considers the trends driving change in the world of work and their impact on safety and health at work. Chapter 2 focuses on four main ways in which the world of work is changing – covering technology, demographics, sustainable development including climate change and changes in work organization. From each of the major developments the report seeks to identify the key opportunities and challenges for OSH and for risk prevention and control. Chapter 3 of the report then reflects on ways that OSH is evolving and rising to the challenge of ensuring a safe and healthy future of work for all.

**STRIETSKA-ILINA, Olga. *A sustainable greener future needs green employment skills* [online]. ILO, 05 June 2019 [cit. 2020-01-27]. Dostupný z: [https://www.ilo.org/global/about-the-ilo/newsroom/news/WCMS\\_709084/lang--en/index.htm](https://www.ilo.org/global/about-the-ilo/newsroom/news/WCMS_709084/lang--en/index.htm).**

Climate change and environmental degradation will have enormous effects on the world of work. But, says Olga Strietska-Ilina, Senior Specialist, Skills and Employability, while there is much discussion about these issues, not enough attention is being paid to giving workers the skills needed to implement a sustainable, 'green' economy.

## OSTATNÍ

**11 of the Fastest Growing Green Jobs. *National Geographic* [online]. National Geographic Society [cit. 2020-01-27]. Dostupný z:**

<https://www.nationalgeographic.com/environment/sustainable-earth/11-of-the-fastest-growing-green-jobs/>.

Green jobs benefit both the economy and the environment, and include everything from alternative fuels to tasty foods (Prezentace s 11 zelenými pracovními místy, v níž jsou popisy jednotlivých pracovních pozic).

**CEDEFOP. *Skills for green jobs: European synthesis report* [online]. Luxembourg: Publications Office of the European Union, 2010 [cit. 2017-08-29]. Dostupný z: [http://www.cedefop.europa.eu/files/3057\\_en.pdf](http://www.cedefop.europa.eu/files/3057_en.pdf).**

Climate change and environmental degradation are jeopardising livelihoods and future sustainability in many areas of economic activity around the world. Alongside other drivers of change such as globalisation and rapid technological change, they are causing important shifts in labour markets and skills needs. Public policies and enterprise strategies in many areas follow calls for innovative, clean and greener economies. Availability of skills for green jobs plays a crucial role in triggering change and facilitating just and timely transitions.

**EATON, Derek; SHENG, Fulei. *Inclusive green economy: policies and practice* [online]. Zayed International Foundation for the Environment & Tongji University, 2019 [cit. 2020-01-27]. Dostupný z:**

<https://greeneconomytextbook.org/wp-content/uploads/2019/11/IGE-text-book-uncompressed-min-2.pdf>.

This textbook attempts to offer that systematic framework for the green economy model. It builds on and extends from the traditional economic growth model by articulating the contributions to productivity from investing in natural capital, clean technologies, and green skills, enabled by fiscal, finance, trade, and labour policies. It also addresses the importance of institutions and progress measurement for ensuring that transition towards a green economy is pro-poor, inclusive, fair, and just. We hope that this textbook will inspire the students of today and prepare them to shape the Inclusive Green Economy of tomorrow.

**European Environment Agency. *Earnings, jobs and innovation: the role of recycling in a green economy* [online]. Luxembourg: Office for Official Publications of the European Union, 2011 [cit. 2017-08-29]. Dostupný z: <https://www.eea.europa.eu/publications/earnings-jobs-and-innovation-the>. ISBN 978-92-9213-234-7.**

This short report explains the role of recycling in the green economy and examines the evidence of its contribution in Europe, focusing primarily on the economic benefits that recycling offers.

**Green job. *Wikipedia, the free encyclopedia* [online]. Wikimedia, last edited on 23 January 2020 [cit. 2020-01-27]. Dostupný z:**

[https://en.wikipedia.org/wiki/Green\\_job](https://en.wikipedia.org/wiki/Green_job).

Green jobs or green-collared jobs are, according to the United Nations Environment Program, "work in agricultural, manufacturing, research and development (R&D), administrative, and service activities that contribute(s) substantially to preserving or

restoring environmental quality. Specifically, but not exclusively, this includes jobs that help to protect ecosystems and biodiversity; reduce energy, materials, and water consumption through high efficiency strategies; de-carbonize the economy; and minimize or altogether avoid generation of all forms of waste and pollution." The environmental sector has the dual benefit of mitigating environmental challenges as well as helping economic growth.

Green jobs, according to the Bureau of Labor Statistics, are classified as, "jobs in business that produce goods or services that benefit the environment or conserve natural resources"[1] or "jobs in which workers' duties involve making their establishment's production processes more environmentally friendly or use fewer natural resources".[2] The Bureau of Labor Statistics categorizes Green Jobs into the following: Water conservation, Sustainable forestry, Biofuels, Geothermal energy, environmental remediation, Sustainability, Energy auditors, Recycling, Electric Vehicles, Solar power, and Wind energy.[3]

These definitions include jobs which seek to use or develop renewable forms of energy (i.e. wind, hydropower, geothermal, wind, landfill gas and municipal solid waste) as well as increase their efficiency. Under the green jobs domain education, training, and public awareness are also included. These jobs seek to enforce regulations, support education, and increase public influence for the benefit of the environment.

Green jobs can also be termed sustainability jobs, eco jobs or environmental jobs.

***Green jobs: good for you, for the environment and for the economy [online]. Iberdola, c 2020 [cit. 2020-01-27]. Dostpný z:***

<https://www.iberdrola.com/environment/what-are-green-jobs>.

The transition to a decarbonised economy is not only essential to halting climate change, but is also a driver of economic growth with the potential to create millions of green jobs. We are talking about jobs aimed directly at protecting the environment or which seek to minimise impact on the health of the planet.

***Green economy and green jobs: challenges and opportunities in Europe and Central Asia: discussion paper [online]. United Nations Development Programme, Mar 11, 2019 [cit. 2020-01-27]. Dostupný z:***

<https://www.eurasia.undp.org/content/rbec/en/home/library/sustainable-development/green-economy-and-green-jobs-challenges-and-opportunities.html>.

The Sustainable Development Goals (SDGs) adopted in September 2015 set up a new global development agenda. The most prominent feature of this agenda is its transformative nature and complex approach that combines social, economic and environmental issues. Improving human well-being and social equity in a way that doesn't harm the environment but reduces environmental risks scarcities requires a new economy: a green economy. The importance of the green economy is recognised in the SDGs, where 56 (or one-third) of the 169 targets relate to the green economy.

This discussion paper explores challenges and opportunities for green economy and green jobs in Europe and Central Asia. It starts with situation overview, provides references to tools, and presents a number of case studies, including Biomass Project in Moldova, Experience of Private Sector Boyner Group in Turkey, Broad and innovative Green Economy Project in Belarus, Towards Carbon Neutral Tourism in Montenegro, City Almaty Sustainable Transport in Kazakhstan, and “The Day after Tomorrow, Greening the Economy” innovations and skill for green jobs approach in Albania.

**JILCHA, Kassu; KITAW, Daniel. Industrial occupational safety and health innovation for sustainable development. *Engineering Science and Technology, and International Journal*. February 2017, Volume 20, Issue 1, Pages 372-380. Dostupný také z:**

[https://ac.els-cdn.com/S2215098616308497/1-s2.0-S2215098616308497-main.pdf?\\_tid=708ad276-af23-11e7-9d5c-0000aab0f02&acdnat=1507795428\\_30f4991749a840b8be5bafabb6ac2b6f](https://ac.els-cdn.com/S2215098616308497/1-s2.0-S2215098616308497-main.pdf?_tid=708ad276-af23-11e7-9d5c-0000aab0f02&acdnat=1507795428_30f4991749a840b8be5bafabb6ac2b6f).

Sustainable development is not thought in a box without development pillars. Previous researchers put these pillars as economy, social and environment. Upon improving these three pillars, sustainable development becomes trustworthy in relation to workplace safety and health improvement. However, the researchers' findings have drawback in considering existing three pillars. Previous researches neglected to incorporate the other three pillars of sustainable development which are culture, political and technological factors. Having these pillars, sustainable development can also be guaranteed by considering workplace safety and health innovation for all internal and external entities engage at work. This is because of the implementation the pillars reduce the working environment accidents and disease. Hence, this research focuses on the workplace safety & health innovation, introducing new pillars for sustainable development, their impact on sustainable developments and indicating the three pillars future research areas. Methods like literature review, interviewing employees and observation of industries were used. There were few researches found on how sustainable development affected by workplace safety and health innovation approaches. However, this literature more focused on the relationship workplace innovation and sustainable development share in common. The other finding in this study showed that the innovation of workplace safety and health brings sustainable development through healthy people, safer workplace, reduced cost of accidents, controlled environment, managed workplace accidents and improved workplace safety knowledge. The researchers have also attempted to forward roads toward sustainable development through occupational safety and health innovation and improvement approaches.

- **Keywords:** Safety and healthInnovationPillarsWorkplaceSustainable development

**NOVELLO, Amanda;v CARLOCK, Greg. *Redefining Green Jobs for a Sustainable Economy* [online]. The Century Foundation, December 2, 2019 [cit. 2020-01-27]. Dostupný z:**

<https://tcf.org/content/report/redefining-green-jobs-sustainable-economy/>.

The movement toward a Green New Deal policy platform<sup>1</sup> has become the predominant idea for addressing climate change. It would involve a massive government investment in equitable decarbonization, which would create millions of “green jobs.” The impact would be this large not only because greening the economy will be labor intensive across all sectors, but also because a green jobs guarantee would be required in order to ensure that all workers would be supported throughout this green transition.

**PAVLOVA, Margarita. Emerging environmental industries: impact on required skills and TVET systems. *International Journal of Training Research*. 2019, vol. 17, Issue sup1: Special Open Access Supplement Issue: Emerging Labor Markets of the Future – Re-imagining Skills Development and Training, Joint Editors: Sungsup Ra, Shanti Jagannathan and Rupert Maclean. Dostupný online z:**

<https://www.tandfonline.com/doi/pdf/10.1080/14480220.2019.1639276?needAccess=true>.

The global urgency for green growth and mitigation of climate change has resulted in the need for a labor force with skill sets necessary for establishing and sustaining new environmental industries, services, and practices. This emerging labor market requires technical and vocational education and training (TVET) systems and skills development programs to respond. This article analyzes recent trends in Hong Kong, China; India; and Malaysia where government policies in the last two decades have paved the way for the rapid development of these industries, resulting in new employment opportunities for young people and new skills requirements. It analyzes how these are being met, and reports on some effective responses by governments and TVET providers. Finally, it suggests an evidence-based, holistic framework to support the development of road maps relevant to different contexts that extend beyond TVET to all levels of education, and which involves close partnerships between governments, industry, civil society, and education.

- **Keywords:** Green growth, labour market restructuring, environmental policies, green skills, Hong Kong, Malaysia, India

**PLAZA, Grażyna; ACHAL, Varenayam; KUMARI, Deepika. Microbiological Risk Assessment and Bioprocess Engineering. *Multidisciplinary Aspects of Production Engineering*. 2018, vol. 1, no. 1, s. 233-239. Dostupný z: <https://content.sciendo.com/abstract/journals/mape/1/1/article-p233.xml>.**

The Europe 2020 strategy (European Commission, 2010) calls a bioeconomy as a key element for smart and green growth in Europe. The development of a greener and

more resource-efficient economy gives rise to new technologies and materials, which in turn may result in increased exposure to biological agents or combinations of different potentially harmful factors. For example, the expanding recycling industry employs an increasing number of workers which have to face various health problems (pulmonary, gastrointestinal and skin problems) as a result of exposure to biological agents such as airborne microorganisms. However, specific numbers for occupational diseases in this sector are still lacking. There are various workplaces and professional activities especially from the green industry for which exposure to microbiological agents occur unexpectedly and in an uncontrolled way. The issue of uncontrolled microbial exposure there is for example in waste treatment and for retrofitting activities, both growing sectors of employment in a greening society. As a result of the problem in the green industrial sector, there is a need to develop tools for risk assessment and prevention measures. In order to be able to develop suitable risk management strategies, a further development of detection and identification methods for biological agents is needed to cover the whole spectrum of microorganisms. the present paper focuses on the microbiological risk assessment in the context of the development of new and safe industrial products and processes of green industry (bioindustry and bioprocessing).

**REE, Kees van der. Promoting Green Jobs: Decent Work in the Transition to Low-Carbon, Green Economies. *International Development Policy* [online]. 2019, no. 11, s. 248-271 [cit. 2020-01-27]. Dostupný z:**

<https://journals.openedition.org/poldev/3107>.

This chapter explores the nexus between climate change and jobs. For the International Labour Organization (ILO), the relevance of climate change and low carbon development has not always been evident. Member states and social partners have long been reluctant to include the transition to low carbon economies in the programme of work and commit resources to it. But in recent years, environmental issues have become a policy priority among ILO member states and social partners. Why, then, is climate change now more relevant than ever for the world of work? What are the current and forecasted employment and social implications of climate change and the policies for adaptation and mitigation? How can the distributional impact of the move to a low-carbon society be better understood and managed? In this respect, how relevant is the concept of 'green jobs'? What policy approach has emerged within the ILO despite initial resistance and disagreement among constituents? Finally, what role could the ILO play in the future to promote social justice in the transition?

**REINHOLD, Karin; JÄRVIS, Marina; prause, Gunnar. Occupational asfety and health aspects of green shipping in the Baltic sea. *Entrepreneurship and Sustainability Issues* [online]. 2019, vol. 7, no. 1 [cit. 2020-01-27]. Dostpná z: [http://jssidoi.org/jesi/uploads/articles/25/Reinhold\\_Occupational\\_health\\_and\\_safety\\_aspects\\_of\\_green\\_shipping\\_in\\_the\\_Baltic\\_Sea.pdf](http://jssidoi.org/jesi/uploads/articles/25/Reinhold_Occupational_health_and_safety_aspects_of_green_shipping_in_the_Baltic_Sea.pdf).**

After the implementation of the SECA regulation in BSR in 2015, one other step towards cleaner shipping will be the NECA regulation from 2021. Thus, green shipping is an important highlight on the Baltic Sea Region (BSR) environmental agenda. It is well known that shipping is one of the most international industries but it also represents one of the most dangerous businesses since maritime sector workers are often exposed to a number of occupational hazards such as difficult and uncontrolled climate conditions, emissions, noise, vibration, chemicals, and long hours of work in combination with rigid organisational structures, isolation and high levels of psychological stress. Maritime workers are often confronted with health problems, occupational diseases, incidents and occupational accidents. This sends a strong pointer that green shipping should also imply greener maritime jobs so that the work becomes safer for workers and corresponds to the global challenges of environmental protection, economic development and social inclusion. The presented research analyses the health and safety aspects of green shipping in the context of occupational health and safety (OSH) to identify set of indicators that are essential to be applied in green shipping. The central research question evaluates health and OSH risks of BSR inhabitants and seafarers to determine the extent to which the SECA regulations have helped to improve health and work related conditions in the BSR.

**SCHULZ, Florence. 'Green' jobs see slight rise in Germany. *EURACTIV* [online]. 22. 10. 2019 [cit. 2020-01-27]. Dostupný z:**

<https://www.euractiv.com/section/energy/news/green-jobs-see-slight-rise-in-germany/>.

In 2017, 263,883 people were employed in the environmental sector in Germany, which was about 12,600 more than in the previous year. Although this means that the amount of so-called “green jobs” saw a slight rise in Germany, the stagnating wind industry continues to hamper growth.

***Summary of the Making Green Jobs Safe Workshop* [online]. National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention, Department of Health and Human Service, 2009 [cit. 2017-10-12]. Dostupný z: <https://www.cdc.gov/niosh/docs/2011-201/pdfs/2011-201.pdf>.**

Green jobs—good for the environment, good for the economy. But how do we assure that green jobs are also good for workers? The National Institute for Occupational Safety and Health (NIOSH), through the Prevention through Design Program, launched the Going Green: Safe and Healthy Jobs initiative to make sure that green jobs are good for workers by integrating worker safety and health into “green jobs” and environmental sustainability. Green jobs, which have been defined broadly as jobs that help improve the environment and enhance sustainability, offer opportunities as well as challenges for workers. Examples of green jobs include manufacture, installation, and maintenance of solar panels and generators; construction and maintenance of wind energy turbines; jobs related to recycling; jobs related to the manufacture of green products; and jobs where green products are used in traditional fields such as

agriculture, healthcare, and the service sector. In some instances, the hazards to workers may be similar to those in established industries. However, some green and sustainable practices may pose new health concerns for workers

**The transition to a green economy must include better safety standards for workers. UN News Centre [online] [cit. 2017-10-12]. Dostupný z:**

<http://www.un.org/apps/news/story.asp?NewsID=41885#.Wd8t6Vu0OUk>.

28 April 2012 – Protecting the safety and health of workers across the world must be part of transitioning into a green economy, the United Nations stressed today, warning that while sustainable jobs may protect the environment and create new employment opportunities, they may also present a number of unforeseen risks for individuals.

**UNEP. *Green jobs: towards decent work in a sustainable, low carbon world* [online]. UNEP, 2008 [cit. 2017-08-29]. Dostupný z: [http://adapt.it/adapt-indice-a-z/wp-content/uploads/2013/08/unep\\_2008.pdf](http://adapt.it/adapt-indice-a-z/wp-content/uploads/2013/08/unep_2008.pdf).**

Environmentální program OSN. Green Jobs: Towards Decent Work in a Sustainable, Low-Carbon World is the first comprehensive report on the emergence of a “green economy” and its impact on the world of work in the 21st Century.

**Workers’ safety and health in green jobs [online]. European Agency for Safety and Health at Work, c2017 [cit. 2017-08-29]. Dostupný z:**

<https://osha.europa.eu/en/emerging-risks/green-jobs>.

The EU is working hard to balance economic growth with the need to protect the environment, and has set itself challenging targets for reducing greenhouse gas emissions, increasing energy efficiency and promoting renewable energy, and reducing waste.

This has given rise to a wide range of green jobs — jobs which contribute to preserving the environment, or restoring it to what it was. If they are to be truly sustainable, though, we need to make sure that these jobs provide safe, healthy and decent working conditions. Green jobs need to be good for workers, as well as good for the environment.

## **ODBORNÁ LITERATURA BEZ PŘÍSTUPU K PLNÉMU TEXTU**

**ANGHELUȚĂ, Petrică Sorin; CIOBOTARU, Arghir Vasile. Sustainable development and human capital component. Competitiveness of Agro - Food & Environmental Economy. 2014, s. 251-258.**

The desire to progress is evident to any community, whether national, regional or local. Sustainable development is part of economic development. This article aims to analyse sustainable development in terms of its human capital component. Thus, the article presents information on both sustainable development and the present situation of the level of education of human resources. The education level of the population of a community has a major influence on the decisions that the community can take to ensure economic progress of the community.

- economic growth, green economy, human capital, Romania, sustainable development

**BATTAGLIA, M.; CERRINI, E.; ANNESI, N. Can environmental agreements represent an opportunity for green jobs? Evidence from two Italian experiences. *Journal of Cleaner Production*. 2018, Vol. 175, S. 257-266.**

Until today, following the rise of the so-called “green economy” paradigm, research into green jobs has mainly focused on the relationship between the rise of the green economy and the effects on creation of new opportunities of green employment. This study aims to link new green jobs and new green business models with industrial reconversion through the experiences of environmental rehabilitation in two Italian industrial areas characterized by the implementation of environmental agreements. The two cases are compared on the base of an analysis of formal documents and through semi-structured interviews with local representatives. The analysis highlights a series of enabling conditions and barriers to the creation of green jobs and local green businesses development. Stakeholder cooperation, as well as industries and research interaction, emerge as the main driving factors. Conversely, bureaucracy and lack of infrastructural investments are revealed as barriers to the creation of green jobs and local green businesses development. This study enriches the academic literature, shifting the attention from the impacts of green policies and green jobs, to those factors that are able to stimulate the employment growth. The definition of enabling conditions and barriers could support policy makers and other local stakeholders in implementing future programmes and actions for local development in areas characterized by similar conditions.

- Environmental agreements, Environmental rehabilitation, Green economy, Green jobs, Stakeholder cooperation, Sustainable development

**BOREL-SALADIN, Jacqueline M.; TUROK, Ivan N. The impact of the green economy on jobs in South Africa. *South African Journal of Science*. 2013, Vol. 109, Issue 9/10, s. 1-4. (plný text)**

The article examines the effects of green economy on jobs and employment in South Africa. It assesses the green job estimates in the "IDC's Green Jobs: An Estimate of the Direct Employment Potential of a Greening South African Economy" and "South African Energy Sector Jobs to 2030: How the Energy Revolution Will Create Sustainable Green Jobs." It highlights the potential sources of green jobs and the role of government policy as obstacles in job increase in the region.

- green economy, green job estimates, jobs, regulations, skills

**COCA, Germán ...[et al.]. Sustainable evaluation of environmental and occupational risks scheduling flexible job shop manufacturing systems. *Journal of Cleaner Production*. 2019, Vol. 209, s. 146-168.**

Sustainability has become a challenge of relevant importance for organizational management. Companies should not only achieve appropriate levels of economic efficiency, but also of environmental and social efficiency. In this sense, the inclusion of sustainability principles in the scheduling of flexible job shop systems (FJS) has focused on the evaluation of energy consumption and key economic indicators (makespan, total weighted tardiness ...). An industrial case (Medellín, Colombia) from the metal-mechanic sector is used to illustrate the simultaneous evaluation of the three sustainability dimensions: economic, environmental and social. The makespan is the indicator associated with the economic performance; CO<sub>2</sub> equivalent emissions, water consumption, metal waste, and chrome waste are the indicators to evaluate the environmental performance; and weight manipulated at workstations, noise, ambient temperature, and vibrations are the indicators associated with the social performance. The measurement, normalization, and weighted sum of the previous indicators, allow for the estimation of the performance of each sustainability dimension. The NSGA-II and NSGA-III methods are used in order to carry out the multi-objective evaluation process, based on the values estimated for the three general objectives (i.e., environmental, social, and economic). Consequently, in the industrial case analyzed, the applied methods identify the corresponding structure of the Pareto optimal fronts. The post-optimal analysis of the solutions shows that the solutions can be directly associated with market demand tendencies, and their implementation can be detected in advance. Solutions that balance economic, environmental, and social efficiency, could be potentially selected according to the market trend, reaching a win-win scenario for all actors involved.

- Environmental risks, Flexible job shop, Occupational risks, Scheduling, Sustainability indicators,

**DUMONT, Antoinette M.; BARET, Philippe V. Why working conditions are a key issue of sustainability in agriculture? A comparison between agroecological, organic and conventional vegetable systems. *Journal of Rural Studies*. Volume 56, November 2017, Pages 53-64.**

This study investigates whether 'green jobs' in agriculture could contribute to better working conditions. We examine a sample of 41 conventional, organic and agroecological vegetable producers who provide fresh produce for markets exploring their working conditions and the employment conditions of their workers, in Wallonia (Belgium). Drawing on the sociological, economic and agricultural literature, we identify nine dimensions that determine working conditions: leeway and control level; income and social benefits; work (in)security; political experience at work; time at work; intrinsic benefits of work; work-related discomfort; occupational health; and competence. We also assess the employment contracts of workers and the way producers manage their

workers. Overall we identify four key issues. First, working conditions were not necessarily better for producers in systems that put more emphasis on ecological values. The socio-economic viability of three production systems, including agroecological market gardening on small areas of land, is insufficient. Second, workers in all systems, except in one agroecological system, experience poor employment conditions. Third, each group of producers has to make trade-offs between the ecological, societal and economic dimensions of their business. Finally, we note that socio-economic and political context, history, work orientation and socio-cultural heritage have more influence on producers' working conditions than their degree of mechanization.

- **Keywords:** WorkViabilityAgroecologyOrganicLaborSocial sustainability

**DVOŘÁK, Petr ...[et al.]. Renewable energy investment and job creation; a cross-sectoral assessment for the Czech Republic with reference to EU benchmarks. *Renewable & Sustainable Energy Reviews*. 2017, Vol. 69, s. 360-368.**

The development of renewable energy sources has been primarily justified on the ground of environmental policies and energy security, but new jobs opportunities and establishment of new economy sectors may be equally important co-benefits from investments in this sector. The main goal of this paper is to assess the employment benefits of investments in renewable energy in the Czech Republic. We examine the level and rate of the development of the renewable energy sector in the Czech Republic in terms of ('green') job creation for the period 2008–2013, in comparison to data from other EU countries, including Germany as a leading early investor in renewables. Whilst the deployment of renewable energy in the Czech Republic has succeeded to create a significant number of jobs (more than 20 000 employees in 2010), our analysis illustrates a strong dependency of job creation on the continuation of financial incentives. We also find that biomass and waste energy processing offer the highest employment per MWh, which benefits employment in (economically fragile) rural areas. We discuss the question of competitiveness of a country that was not amongst the early adopters of renewables, arguing that the technical skills of the labour force in the Czech Republic provide a potential for more sustained investments in the sector.

- Financial incentives, Green jobs, Renewable energy, Rural employment

**EVANS, Claire; STROUD, Dean. Greening steel work: Varieties of Capitalism and the 'greening' of skills. *Journal of Education & Work*. 2016, Vol. 29, Issue 3, s. 263-283.**

An important driver of change in work, employment and skills is European Union policy aims of sustainable economic growth and the cultivation of a green economy. Part of the latter – which is supported by increasing environmental regulation – focuses on the development of a 'green skills agenda', which involves the 'greening' of existing occupations as well as meeting the skill needs of new environmental sectors and occupations. In this paper, we compare attempts to 'green' work and skills through an

examination of engineering apprenticeships within the German and British steel industries. We argue that efforts to 'green' skills are taking place at varying degrees of intensity, mostly because of variations in institutional context. The evidence we present suggests that implementation of change is much more dynamic in the context of Coordinated Market Economies such as Germany, where development is shaped by robust VET frameworks and wider processes of environmental innovation. In contrast, within Liberal Market Economies such as the UK, there are significant barriers to the vision for and investments in skills generally, as well as those necessary for greening the labour process, with an extant development paradigm that is driven by short-term benefits and a limited focus on environmental compliance.

- Apprenticeship, green skills, political economy, vocational education

**GOODS, Caleb. Labour unions, the environment and „green jobs“. *Journal of Australian Political Economy*. 2011, Issue 67, s. 47-67. (plný text)**

The article discusses the importance of labor unions to the progressive shift towards fusing ecological and labor sustainability. It examines the environmental policy agenda of the Australian government and offers a review of the response of the labor movement to the challenge of producing environment-friendly jobs. The author explores the issues in Australia that should be addressed if labor unions are to take a leadership role within future sustainable strategies.

- LABOR unions, ENVIRONMENTAL policy, LABOR movement, SUSTAINABILITY

**GORDON, Kate; SOARES, Louis; STEIGLEDER, Stephen. Preparing America's workforce for jobs in green economy: a case for technical *Duke Forum for Law & Social Change (DFLSC)*. 2012, Vol. 4, p23-44.**

The article discusses the challenges and opportunities that are created by the shift to a cleaner and more sustainable energy economy in the U. S. as of January 2012. It recommends that policymakers should direct workforce and economic development budgets and policies to promote innovation and more applied research into best practices. The works of the Political Economy Research Institute (PERI) on the subject are also cited.

**GRISWOLD, Wendy. Community Education and Green Jobs. *Adult Learning*. 2013, Vol. 24, Issue 1, s. 30-36. (plný text)**

Green jobs are currently a much-discussed topic in political, economic, and educational forums. Millions of Americans would be very glad to have one. But what are they exactly? Or more pointedly, what should they be and how can the field of adult education support their development? From the perspective of a community educator who has worked in the field of environmental education and environmental justice for more than 15 years, green jobs should be more than environmentally friendly employment, as defined by the Bureau of Labor Statistics. They should serve to

advance the development of sustainable societies. To do this, there are three elements that, woven together, can create green jobs that will serve society in significant ways. These elements are workforce development; science, technology, engineering, and mathematics (STEM) education; and community education for sustainability. Examples of existing programs that address these elements will be discussed below.

- community education, green jobs, STEM education, sustainability, workforce development

**CHENEVAL, Erwan ...[et al.]. Green Jobs: Definition and Method of Appraisal of Chemical and Biological Risks. *Annals of Occupational Hygiene*. 2016, Vol. 60, Issue 3, s. 290-304.**

In the wake of sustainable development, green jobs are developing rapidly, changing the work environment. However a green job is not automatically a safe job. The aim of the study was to define green jobs, and to establish a preliminary risk assessment of chemical substances and biological agents for workers in Quebec. An operational definition was developed, along with criteria and sustainable development principles to discriminate green jobs from regular jobs. The potential toxicity or hazard associated with their chemical and biological exposures was assessed, and the workers' exposure appraised using an expert assessment method. A control banding approach was then used to assess risks for workers in selected greenjobs. A double entry model allowed us to set priorities in terms of chemical or biological risk. Among jobs that present the highest risk potential, several are related to waste management. The developed method is flexible and could be adapted to better appraise the risks that workers are facing or to propose control measures.

- biological agents, chemical agents, control banding, green job, risk appraisal, waste management

**IAVICOLI, Ivo ...[et al.]. Opportunities and challenges of nanotechnology in the green economy [et al.]. *Environmental Health*. December 2014, Vol. 13, No. 78.**

In a world of finite resources and ecosystem capacity, the prevailing model of economic growth, founded on ever-increasing consumption of resources and emission pollutants, cannot be sustained any longer. In this context, the “green economy” concept has offered the opportunity to change the way that society manages the interaction of the environmental and economic domains. To enable society to build and sustain a green economy, the associated concept of “green nanotechnology” aims to exploit nano-innovations in materials science and engineering to generate products and processes that are energy efficient as well as economically and environmentally sustainable. These applications are expected to impact a large range of economic sectors, such as energy production and storage, clean up-technologies, as well as construction and related infrastructure industries. These solutions may offer the opportunities to reduce pressure on raw materials trading on renewable energy, to improve power delivery systems to be more reliable, efficient and safe as well as to use unconventional water

sources or nano-enabled construction products therefore providing better ecosystem and livelihood conditions.

However, the benefits of incorporating nanomaterials in green products and processes may bring challenges with them for environmental, health and safety risks, ethical and social issues, as well as uncertainty concerning market and consumer acceptance. Therefore, our aim is to examine the relationships among guiding principles for a green economy and opportunities for introducing nano-applications in this field as well as to critically analyze their practical challenges, especially related to the impact that they may have on the health and safety of workers involved in this innovative sector. These are principally due to the not fully known nanomaterial hazardous properties, as well as to the difficulties in characterizing exposure and defining emerging risks for the workforce. Interestingly, this review proposes action strategies for the assessment, management and communication of risks aimed to precautionary adopt preventive measures including formation and training of employees, collective and personal protective equipment, health surveillance programs to protect the health and safety of nano-workers. It finally underlines the importance that occupational health considerations will have on achieving an effectively sustainable development of nanotechnology.

- **Keywords:** Green economy, Nanotechnology, Sustainable development, Occupational health, Safety, Environmental risk, Ecology, Engineered nanomaterials, Material science

**KARIMOVA, Tahmina; ECHEVERRÍA MANRIQUE, Elizabeth. Regulatory frameworks: Integration, partnerships and dialogue. *World Employment and Social Outlook*. May 2018, Issue 2, s. 71-101.**

International labour standards ensure a just transition to a green economy. They provide the legal foundation to deal with social issues of the green economy, and can promote decent working conditions in green sectors. Some countries are integrating decent work agenda in their environmental legislation. Social dialogue can help a transition to sustainable economies. It can prevent and reduce the environmental impact of enterprises, and improve working conditions, as appropriate environmental regulations and practices also help to prevent and minimize risks to worker health

**KAYAHAN KARAKUL, Aygülen. Educating labour force for a green economy and renewable energy jobs in Turkey: A quantitative approach. *Renewable & Sustainable Energy Reviews*. 2016, Vol. 63, s. 568-578.**

Today, the struggle of man against nature has reached the point where nature has been objectified and dominated by resource exploitation as we are faced with huge problems like decreasing natural resources; destruction of climate-ozon layer-glaciers; altering the rhythm of seasons; global warming; decreasing agricultural areas and more negative conditions brought on by the burgeoning human population. These problems threaten the life of all living creatures in the natural world itself. One critical factor is that humanity must harness the ability to create truly renewable energy

sources instead of depleting the natural resources directly in order to generate the energy to sustain the lifestyles of today. One aspect of this struggle is to educate the leadership and labour force to actively realize green economies and jobs in the renewable energy sector. In the Turkish educational system, there is a true disconnect between the educational system and the labour markets that is causing a rise in unemployment rates among graduates. Educating green collar workers is an important opportunity for Turkey to develop consistency within the labour markets that have rapidly weakened since 2000. This paper presents an overview of educational policies regarding the development of a green collar industry by facilitating renewable energy jobs through vocational-technical high schools and graduate and post graduate university programmes. It also analyses state policies on popularising business and industry to actually create green collar jobs for the development of a new social paradigm of sustainable development.

- Educating green collar workers, Green collar workers, Green economy, ILO International Labour Organization, MoNE Ministry of National Education, Renewable energy, SSAC Student Selection and Allocation Centre, VQI Vocational Qualification Institute

**KIZU, Takaaki ...[et al.]. Skills for the green transition. *World Employment and Social Outlook*. May 2018, Issue 2, s. 129-155.**

The transition to a green economy cannot be achieved without a skilled labour force. Skills development contributes to resilience by helping workers move to sectors with employment growth and to better jobs. It can also promote innovation, investment and competitiveness, thus creating a virtuous cycle. Imbalances persist between skills offered and skills needed for the green transition. A few countries integrate environmental sustainability and skills policies. Many countries have not yet developed or utilized their skills institutions to prepare for the green transition. Discussions on skills for the green transition tend to be led by governments with the involvement of employers, but to a lesser extent of trade unions.

**KRISBERG, Kim. From greening workplaces to greening workers. *Nation's Health*. 2008, Vol. 38, Issue 3, s. 13. (plný text)**

This article reports on the efforts of community activists to promote green-collar economic practices in the U. S. With an emerging green-collar economy and growing demand for workers with green knowledge and skills, activists are highlighting the intersections between poverty, pollution and environmental justice, and helping to build a green economy that benefits all. In Chicago, Illinois, greening the city while teaching job skills is becoming a tradition. Green opportunities are also happening to the east in Richmond, Virginia.

**MONTT, Guillermo ...[et al.]. Employment and the role of workers and employers in a green economy. *World Employment and Social Outlook*. May 2018, Issue 2, s. 37-68.**

Many jobs can be created by achieving sustainability in the energy sector. Limiting global warming to 2 degrees Celsius by 2100 will create 24 million jobs in construction, electrical machinery manufacturing, copper mining, renewable energy production and biomass crop cultivation. 6 million jobs can be created by adopting the circular economy. Promoting sustainability in agriculture will change rural economies. Workers and employers are key actors in the transition towards environmental sustainability.

**MOREIRA, Sandraa; VASCONCELOS, Liaa; SILVA SANTOS, Carlos. Occupational health indicators: Exploring the social and decent work dimensions of green jobs in Portugal. *Work*. 2018, vol. 61, no. 2, pp. 189-209.**

**BACKGROUND:** Green jobs, being in line with the goals of sustainable development, promote “smart, sustainable and inclusive growth”, ensure a healthy functioning of Earth’s ecosystems and guarantee decent work for all workers and high levels of workers’ health. **OBJECTIVE:** Assessing whether green jobs protect and promote the health of workers and, at the same time, contribute to a reduction of occupational diseases and health damage resulting from accidents at work. **METHODS:** A core-set of Occupational Health indicators were selected to analyze the “sustainable work” in green employment, based on Annual Report. The indicators were applied to 281,124 establishments and 2,780,686 workers in Portugal. **RESULTS:** In the green job there is a lower level of organization as regards Occupational Health and Safety Services with a lower coverage of working population, and the incidence and severity of accidents at work is higher, as well as the percentage of workers with a lower level of professional qualification. **CONCLUSIONS:** Green job is not necessarily translated into safe, healthy and decent work. There is need and urgency to ensure a proper monitoring of green jobs in the context of Occupational Health, a requirement that should not be underestimated, if sustainable development is to be achieved.

- **Keywords:** Sustainable development, green economy, occupational health and safety, environment and occupational health, occupational risks

**OMATULE ONUBI, Hilary; YUSOF, Nor'Aini, SANUSI HASSAN, Ahmad. Adopting green construction practices: health and safety implications. *Journal of Engineering, Design and Technology*. 16 November 2019. ISSN 1726-0531.**

**Purpose:** This study aims to assess the impact of adopting selected green construction site practices on the health and safety performance of the construction projects. The impact of storm-water management, energy management and construction waste management on projects health and safety performance was also examined. **Design/methodology/approach:** A survey was conducted to collect information from Class A contractors in Nigeria, and 168 usable responses were received. The data were analysed using the partial least squares (PLSs) structural equation modelling technique. **Findings:** The findings indicate that energy

management and waste management practices have significant effects on the health and safety performance of the construction projects, while storm-water management has no effect. **Practical implications:** Project and site managers need to take into consideration the skill set of their workforce when attempting to adopt new innovative construction strategies the workers are unfamiliar with in a changing construction environment. There is also a need for more training of workers on generic and specific green skills to avoid health and safety challenges on site. **Originality/value:** The findings of this study make significant contribution to the debate on the health and safety performance of green projects, as only a few studies have been conducted on this topic. The empirical relationships between the constructs of energy management, waste management, storm-water management and health and safety performance are unique in the context of other related studies and have advanced the body of existing knowledge.

**RASCÓN, Danyela Samaniego; FERREIRA, Almerindo D.; SILVA, Manuel Gameiro da. Occupational exposures to solar radiation in concentrated solar power systems: A general framework in central receiver systems. *Renewable & Sustainable Energy Reviews*. 2016, Vol. 65, s. 387-401.**

Due to the growing motivation of countries to use renewable energy, instead of fossil fuels, for the production of electricity, the number of solar power plants had an increase in recent times. The sun as a renewable source is used by the Concentrated Solar Power systems (CSP) to achieve this goal. This process results in a considerable amount of concentrated solar radiation (visible light, infrared and ultraviolet radiation) inside and in the neighborhood of the installations. Some previous studies have addressed the possible risks for health of workers in environments where they perform activities in outdoors exposed to solar radiation. The overall purpose of this paper is to provide information about the environmental conditions in facilities using CSP technology, the effects of solar radiation in humans and the methods for the risk assessment in this type of facilities. Several standards including elements applicable to the field of occupational health in the central receiver area of solar power plants are also referred.

- Concentrated solar power systems, Environmental conditions, Green jobs hazards, Health effects, Non-ionizing radiations, Solar energy

**SCULLY-RUSS, Ellen. Are Green Jobs Career Pathways a Path to a 21st-century Workforce Development System? *Adult Learning*. 2013, Vol. 24, Issue 1, s. 6-13. (plný text)**

This article examines policy reports that advocate for new green jobs career pathways to help grow the green economy and create new opportunity structures in the green labor market. The reports are based on a series of propositions about the nature of green jobs and the existence of the political will to invest in new green education programs to support the green economy. The purpose of this article is to introduce educators and practitioners to the policy frameworks and

propositions that shape their work to deliver effective green education and certification programs. It offers practical advice on how to understand and influence the basic premises on which green education policies and training resources are based.

- Career, green jobs, pathways, workforce development

**SCULLY-RUSS, Ellen. The Dual Promise of Green Jobs: Sustainability and Economic Equity. In: *The Palgrave Handbook of Sustainability*. Palgrave Macmillan, 2018. S. 503-521. ISBN 978-3-319-71388-5.**

Since a green economy is emerging, its structure, nature, and scope are malleable, offering an opportunity to improve the nature of work while also improving sustainability. This chapter reports on a case study of two green jobs training programs, one in Vermont and one in Pacific Northwest, to determine their effects on job creation and labor market functioning. The study showed that green jobs can both improve the environment and close the equity gap if policy makers leverage market dynamics and public investments to move green employers to adopt a work system based on high quality and skill standards. Results highlighted the need to bring efforts to scale, respect local conditions and relationships, be responsive to industry and worker needs, and develop new methods to synchronize labor market supply and demand.

**Keywords:** Green jobs, Workforce development, Economic equity, Sustainability

**SCULLY-RUSS, Ellen; ROSE, Amy D.; GLOWACKI-DUDKA, Michelle. Green Jobs: Job Training and Career Pathways. *Adult Learning*. 2013, Vol. 24, Issue 1, s. 3-5. (plný text)**

An introduction is presented in which the editor discusses various topics within the issue including job creation, **jobs** training and a national training and certification program in the U. S.

**SCHULTE, Paul A. ...[et al.]. Occupational safety and health, green chemistry, and sustainability: a review of areas of convergence. *Environmental Health: a Global Access Science Source*. 2013, Vol. 12, Issue 1, s. 1-9. (plný text)**

With increasing numbers and quantities of chemicals in commerce and use, scientific attention continues to focus on the environmental and public health consequences of chemical production processes and exposures. Concerns about environmental stewardship have been gaining broader traction through emphases on sustainability and "green chemistry" principles. Occupational safety and health has not been fully promoted as a component of environmental sustainability. However, there is a natural convergence of green chemistry/sustainability and occupational safety and health efforts. Addressing both together can have a synergistic effect. Failure to promote this convergence could lead to increasing worker hazards and lack of support for sustainability efforts. The National Institute for Occupational Safety and Health has

made a concerted effort involving multiple stakeholders to anticipate and identify potential hazards associated with sustainable practices and green jobs for workers. Examples of potential hazards are presented in case studies with suggested solutions such as implementing the hierarchy of controls and prevention through design principles in green chemistry and greenbuilding practices. Practical considerations and strategies for green chemistry, and environmental stewardship could benefit from the incorporation of occupational safety and health concepts which in turn protect affected workers.

- 1-Bromopropane, Alternatives, Environmental health, Life cycle analysis, Nanomaterials, Workers

**SETIAWAN, Agus. Identification of Green Skills Acquisition in Indonesian TVET Curricula. In: *AIP Conference Proceedings*. 2017, Vol. 1887, Issue 1, s. 1-6.**

Recently, many countries have put the focus on green growth which specifically aims at achieving a resilient, low-carbon, and resource-efficient economy model that leads to higher quality of life. Environmental pollution and climate change are negatively affecting the sustainability of various economical activities across the world, with Indonesia being one of them. To mitigate the environmental problems, the existing economy should be shifted to a greener economy model which will create green jobs and greening the existing occupation in the industries. Green jobs require workers with green skills. Therefore, development of green skills in TVET institutions is urgently needed. By referencing the existing green skills frame work, green skills acquisition has not been clearly integrated into the existing Indonesian TVET curriculum. However, approach to integrate green skills into TVET curriculum can be carried out through the development of hard skills and soft skills in the domain of knowledge, abilities, and attitudes where green skills is an imparting of both hard skills and soft skills.

**TRAVERSI, Deborah ...[et al.]. Aerosol exposure and risk assessment for green jobs involved in biomethanization. *Environment International*. May 2018, Vol. 114, s. 202-211.**

Anaerobic digestion is a consolidated biotechnology able to produce renewable energy from biomasses. In the European countries, quick growth of biogas production from different organic matrices including wastes has been observed. In relation to the characteristics and quantity of the anaerobic digestion of feedstock, there are different technologies, advantages and criticisms. An accurate occupational risk assessment and development of management tools for green jobs involved in the anaerobic digestion plants are due. The aim of this work is to assess the aerosol exposure for such workers, focusing on the bioaerosol risk. Full scale plants for the treatment of organic municipal waste, waste water treatment sludge, agro zootechnical and food producing byproducts were involved for this purpose. The bioaerosol levels were monitored during activities through culturing and biomolecular methods; moreover, the sub-fractionated PM10 and carried endotoxins were measured in different plant areas.

Global microbial contamination is higher (>5000 UFC/m<sup>3</sup>) in the area where organic wastes are handled and pretreated, both for organic municipal waste plants - with a bacterial prevalence - and agro zootechnical plants - with a fungi prevalence. Moreover, the microbial contamination is higher where organic municipal waste is present in respect to other biomasses (ANOVA  $p < 0.01$ ). Numerous pathogens are carried by the aerosol. HAdV-4 presence is lower than LOQ (50 gene copies/m<sup>3</sup>) in all the samples. Environmental PM<sub>10</sub> reached the 280 µg/m<sup>3</sup> level including PM<sub>3</sub> for 78%. Endotoxin pollution overtakes the 90 EU/m<sup>3</sup> limit sporadically. Personal PM<sub>4.5</sub> reached 10 mg/m<sup>3</sup> only for maintenance technicians in the pretreatment area for organic municipal waste. The risk can be evaluated under a quantitative and qualitative point of view highlighting risk management improvement for anaerobic digestion plants.

**TRAVERSI, Deborah ...[et al.]. Green job bio-aerosol exposure during anaerobic digestion for biomass energetic valorisation. *Environmental Research*. April 2015, Volume 138, Pages 425-431.**

The continued expansion of the green economy increases the risk profile for green occupational jobs. One of the broadest green sectors in terms of growth is the anaerobic digestion of biomasses. In recent years, this development has also interested Italian regions. The management of biomass includes biological risk and the risk of particulate and endotoxin exposure. In the present study, we evaluated airborne exposure for anaerobic digestion workers at two real-scale plants. Digested biomass has different origins, ranging from cattle sludge and manure to poultry manure to agricultural harvesting or processing residues, particularly from maize and fruits. Two sampling points were chosen: at the first, the input biomasses were stored, and the hopper was loaded; at the second, the digested sludge exited the digester. The microbiological parameters, assessed using an active sampler and cultural method, were the total bacteria counts (at 22, 37, and 55 °C), yeasts, fungi, Pseudomonaceae, *Clostridia spp.*, Enterobacteriaceae and Actinomycetes. Moreover, at the same sampling points, we evaluated six PM<sub>10</sub> fraction levels (10.0–7.2, 7.2–3.0, 3.0–1.5, 1.5–0.95, 0.95–0.49, and <0.49 µm) and the endotoxin content of each fraction. In this investigation, the microbe contamination of the air varied from low to high levels, while the PM<sub>10</sub> and endotoxin levels were limited, reaching rural environmental levels (61.40 µg/m<sup>3</sup> and 18.88 EU/m<sup>3</sup>, respectively). However, contamination and occupational risk must be evaluated individually for each plant because numerous variables influence the risk magnitude, particularly digested sludge treatments, such as input biomass nature, storage, movement conditions, building configuration and technological processes.

- **Keywords:** Anaerobic digestion Pm10 Fine PM Endotoxin Bio-aerosol Occupational exposure Green jobs

**TULCHINSKY, Theodore H.; VARAVIKOVA, Elena A. Environmental and Occupational Health: chapter 9. In: *The New Public Health*. Academic Press, 2014, s. 471-533.**

Environmental and occupational health is affected by chemical, physical, radiological, and biological agents in the air, water, and soil. Health risks include injury, and exposure to toxic radiation, carcinogenic and teratogenic agents, leading to cancer, lung and heart diseases. Environmental factors may result in instant death or long-term illness from unsafe environmental or working conditions. The environment affects populations from small workplace settings to large-scale communities, as well as having global effects. International and governmental responsibility, through policies, laws, regulations, standards, policies, and planning, is vital for tackling global aspects of pollution, including climate change, cataclysmic natural events, drought, air and water pollution, and the potentially catastrophic effects of weather changes. Preparation for disasters is a core public health function in managing the after-effects of tsunamis, hurricanes, floods, and drought. These are potent political and public health issues with huge economic and societal effects.

- **Keywords:** anthropogenic disaster; climate change; ecological shift; geographic epidemiology; natural disaster; occupational safety; radiation; toxicology; vectorborne disease; waterborne disease

**UNAY-GAILHARD, Ľukay; BOJNEC, Štefan. The impact of green economy measures on rural employment: green jobs in farms. *Journal of Cleaner Production*. 2019, Vol. 208, s. 541-551.**

In the circular economy concept, besides protecting the environment, green policy measures provide essential economic benefits through resource security, economic stability, and the creation of green jobs. This study centres its attention on the labour use aspect of the circular economy and aims to examine the potential for green economy measures to create green jobs in the agriculture sector. As a methodological approach, we combine "top-down" and "bottom-up" analyses of the green economy experience of Slovenia, where agri-environmental measures (AEM) play an essential role in the Slovenian rural development programme (2007–2014), with the highest amount of subsidies per unit of output among the 10 new European Union Member States. The results show that an AEM adoption of green policy measures by very large dairy and field crop farms significantly increases total labour use: while for field crop farms this increase is in hired labour, for dairy farms this increase is in family labour. While hired and family labour perform as substitutes for very large dairy farms, they perform as complements for very large field crop farms. The present study suggests further steps towards identifying the green economy measures that are needed to create green jobs in the agriculture sector for rural youth. Highlights • The potential of green economy measures for job creation on farms is examined. • The analyses are based on top-down and bottom-up approaches. • The Between Effect models are applied to examine labour use change on farms. • Labour use increases are observed for very large farms which adopted green measures. • Hired and family labour perform as complements for very large field crop farms.

- Agri-environmental measures, Circular economy, Farm accountancy data network, Farms, Green economy, Green jobs, Slovenia

**VONA, Francesco ...[et al.]. Environmental Regulation and Green Skills: An Empirical Exploration. *Journal of the Association of Environmental and Resource Economists*. October 2018, vol. 5, no. 4, s. 713-753.**

This paper provides new evidence on the workplace skills most relevant in the transition toward environmentally sustainable economies. Using a novel data-driven methodology, we identify two main sets of green skills, namely, engineering skills for the design and production of technology, and managerial skills for implementing and monitoring environmental organizational practices. Exploiting exogenous geographical variation in regulatory stringency, we also evaluate the effect of environmental regulation on the demand of green skills for a panel of US metropolitan and nonmetropolitan areas over the period 2006–14. The main finding is that while these changes in environmental regulation have no impact on overall employment, they create significant, if modest, gaps in the demand for some green skills, especially those related to technical and engineering work tasks.

**WAGNER, Cecelia. Adult Learning Meets the Green Economy. *Adult Learning*. 2013, Vol. 24, Issue 1, s. 14-21. (plný text)**

The new green economy affects adult education and workforce development as adult workers seek skills and knowledge that will help them find success in work and life. Recent years have brought about increased interest in and discussion of training for green jobs. Since the introduction of the Green Jobs Act in 2007, questions about how exactly to train workers for jobs in the changing economy have drawn attention from legislators, educators, and the public at large. Demand for new skill sets and refocused expertise requires workers and educators to not only refine basic skills but also create learning opportunities that meet the needs of the contemporary workplace. This article examines issues, challenges, and implications related to the development of a model for green jobs education. The Green Jobs training project of the Institute for Career Development offers perspective on what education and training programs can do to help ready learners to enter the greeneconomy.

### **TÉMA: ZELENÁ EKONOMIKA A BOZP – TEMATICKÉ ROZŠÍŘENÍ**

Rešerše je zpracovaná pro potřeby výzkumného projektu „Bezpečnost a ochrana zdraví při práci v oblasti rostoucí zelené ekonomiky“. Tato část je tematicky rozšířena o níže uvedené oblasti:

- Cirkulární ekonomika
- Bezpečnost recyklace
- Udržitelná ekonomika
- Oběhové hospodářství
- Bezpečnost zpracování odpadu
- Likvidace, recyklace solární panely
- Likvidace, recyklace Li-Ion baterie

**Klíčová slova v ČJ:** bezpečnost a ochrana zdraví při práci, BOZP, pracovní rizika, zelená ekonomika, cirkulární ekonomika, likvidace solárních panelů

**Klíčová slova v AJ:** occupational safety and health, OSH, occupational risks, green economy, circular economy, disposal of solar panels

**Jazykové omezení:** český, anglický, německý, francouzský

**Časové omezení:** 2017-2019

**Obsah:**

- Zdroje dostupné v odborné knihovně VÚBP, v. v. i .
- Volně dostupné zdroje – české
- Volně dostupné zdroje – zahraniční
- Odborná literatura bez přístupu k plnému textu

## ZDROJE DOSTUPNÉ V ODBORNÉ KNIHOVNĚ VÚBP, V. V. I.

**CEBALLOS, Diana. BEAUCHAM, Catherine; PAGE, Elena. Metal exposures at three U.S. electronic scrap recycling facilities. *Journal of Occupational and Environmental Hygiene*. 2017, roč. 14, č. 6, s. 401-408.**

O mnoha kovech nalezených v elektronickém šrotu je známo, že způsobují vážné zdravotní dopady, včetně rakoviny, respiračních, neurologických, renálních a reprodukčních poškození. Národní ústav pro bezpečnost a ochranu zdraví při práci (NIOSH) provedl tři hodnocení zdravotních rizik u zařízení na recyklaci elektronického šrotu v USA, aby charakterizoval expozici zaměstnanců kovům a doporučil kontrolní strategie ke snížení těchto expozic.

- kovy - kadmium - olovo - elektronika - elektroodpad - šrot kovový - recyklace - expozice pracovníků - USA

**DELECROIX, Bertrand; BOUDRA, Leila. Intégrer la prévention des risques professionnels dans le projet national d'extension des consignes de tri. *Hygiène et Sécurité du Travail*. 2018, č. 250, s. 72-76.**

Třídění odpadu se stává stále důležitějším odvětvím např. vzhledem k nárůstům používání plastů, kterých se produkují stále další a další druhy. Při třídění je tedy třeba vytvářet průběžně nové instrukce pro postup jejich třídění. Národní projekt se zaměřil právě na tuto problematiku.

- odpady - třídění - projekty

**Karta BOZP pro profesi: Pracovník odpadového hospodářství. *Bezpečnost a hygiena práce*. 2017, roč. 67, č. 10, s. 15-17 a 22.**

Karta BOZP pro pracovníky odpadového hospodářství jsou uvedeny: pracovní činnosti tohoto pracovníka prováděné jak ve vnitřním, tak i ve venkovním prostředí, kvalifikační požadavky pro tuto pracovní pozici, relevantní mimořádné provozní události, základní opatření pro předcházení mimořádným událostem nebo jejich následkům, rizikové faktory spojené s tříděním, přepravou a ukládáním odpadu. Pokyny pro zajištění bezpečnosti práce jsou v kartě diferencovány podle místa výkonu práce (sběrné místo) a podle povahy odpadu (tekuté odpady, odpadní kaly, azbest).

- bezpečnost práce - prevence rizik - pomůcky pracovní - nástroje preventivní - karta BOZP - pracovníci - odpady - hospodářství odpadové

**KORDOŠOVÁ, Miroslava. Bezpečnost' a ochrana zdravia pri práci a aspekty zelenej ekonomiky: 3. časť. Bezpečná práca. 2016, roč. 47, č. 2, s. 43-47. ISSN 0322-8347.**

Seriál k problematice BOZP u vybraných obnovitelných zdrojů energie pokračuje třetí částí. Ta je věnovaná BOZP v odpadovém hospodářství.

- BOZP - místa pracovní zelená - ekonomika zelená - technologie - rizika nová - green jobs - green technologies - hospodářství odpadové - odpady - faktory biologické

**Kvalita životního a pracovního prostředí. Inovace. 2017, roč. 23, č. 1, s. 4-5.**

Kvalita životního a pracovního prostředí významně ovlivňuje lidské zdraví. Znečištěné a poškozené prostředí způsobuje řadu onemocnění, předčasných úmrtí a úrazů, nebo k jejich vzniku může přispět. Z hlediska kontaminace prostředí se článek věnuje praxi nakládání s odpady, výskytu radonu, azbestu a jinému záření a karcinogenním látkám v prostředí, a druhům a účinkům těchto rizikových faktorů na lidské zdraví.

- prostředí životní - prostředí pracovní - faktory rizikové - látky karcinogenní - odpady - záření - stav zdravotní – obyvatelstvo

**Kvalita životního a pracovního prostředí. Inovace. 2017, roč. 23, č. 4, s. 41-43.**

Ministerstvo zdravotnictví opět připomíná problematiku a význam kvality pracovního a životního prostředí. Věnuje tuto stať otázce stresu, nanotechnologií, toxických látek, škodlivého záření, hluku a dalších faktorů a jejich vlivu na zdraví člověka.

- prostředí životní - prostředí pracovní - ovzduší vnitřní - ovzduší venkovní - prostředí vnitřní - faktory rizikové - faktory škodlivé - stres - nanomateriály - látky toxické - odpady - záření - hluk - doprava

**LARROQUE, Damien. Quand la ventilation dépoussiére le tri. Travail et Sécurité. 2019, č. 807.**

Recyklace stavebního odpadu je velmi náročný proces z hlediska pracovních podmínek. V průběhu procesu se uvolňuje množství prachu - při příjezdu nákladních

automobilů, během vykládky, drcení, skladování. Na příkladu francouzského podniku Premys je popsáno jako řešení prašnosti strategické umístění mlhovače, který zvlhčuje odpad a hotové výrobky, omezuje suspendaci částic, a tím zlepšuje ruční třídění.

- prach - třídění - odpady - ventilace - rizika - stavebnictví – recyklace

**MORRISON, Delmar "Trey"; STERN, Michael; OSORIO-AMADO, Carmen H. Waste solvents to trash haulers : lessons learned from hazardous waste accidents. *Process Safety Progress*. 2018, roč. 37, č. 3, s. 427-441.**

Společnosti, které zpracovávají odpady, zaznamenaly katastrofické havárie kvůli špatně definované povaze nebezpečí, která jsou s daným druhem odpadu spojena. Článek diskutuje možnosti, jak implementujete program řízení procesní bezpečnosti (process safety management, PSM), když se vstupní toky mohou lišit v důsledku procesů v zařízení, která nejsou pod kontrolou. Hlavním tématem incidentů je, že PSM je složitější, aby se vztahovala na neznámé, smíšené a nekontrolované chemické látky, jak pevné, tak tekuté. Společnost, která pomáhá společnostem, které zpracovávají odpady, poskytuje několik případových studií o požárech a výbuších zahrnujících různé procesy zpracování odpadu v různých zařízeních.

- odpady nebezpečné - látky nebezpečné - rozpouštědla - reaktivita - havárie závažné - nehody - vyšetřování - řízení bezpečnosti - bezpečnost procesní

**Recyclage de tissus: une démarche qui a de l'étoffe: en images. *Travail et Sécurité*. 2017, č. 786, s. 30-37.**

Článek přináší obrazovou dokumentaci a popis procesu třídění a dalšího zpracování materiálů (starého ošacení a obuvi) ve francouzské firmě La Tresse. Od dovozu kamiony, přes vykládku, třídění, lisování atd., kdy jsou zaměstnanci vystaveni různé pracovní zátěži a rizikům.

- recyklace - postupy - zátěž pracovní - rizika pracovní - odpady - zpracování

**TROŠANOVÁ, Mária. Obaly a neobalové výrobky a odpady z nich v kontexte zmien v zákone o odpadoch od 1. januára 2019. *Bezpečná práca*. 2019, roč. 50, č. 1, s. 8-11.**

Článek se věnuje obalům a neobalovým výrobkům a odpadům z nich z pohledu legislativní změny zákona o odpadech, která je na Slovensku platná od 1. ledna 2019.

- obaly - odpady - hospodářství odpadové - legislativa – Slovensko

**YU, Cai-Guo .....[et al.]. Neurocognitive function in relation to blood lead among young men prior to chronic occupational exposure. *Scandinavian Journal of Work, Environment and Health*. 2019, roč. 45, č. 3, s. 298-307.**

Vyšší než současné úrovně expozice a pokročilý věk účastníků studie omezili interpretaci předchozích studií týkajících se neurokognitivních funkcí na expozici olovu.

Tuto asociaci autoři přehodnotili u mladých amerických mužů před chronickou pracovní expozicí v podnicích na recyklaci olova s použitím základních měření ze Studie pro podporu zdraví při recyklaci olova (NCT02243904).

- olovo - recyklace - expozice pracovníků - muži - funkce neurokognitivní - prostředí pracovní – krev

## VOLNĚ DOSTUPNÉ ZDROJE – ČESKÉ

**Dotazník o zdraví a bezpečnosti v cirkulární ekonomice: odpadní vody a odpad [online].** European Public Service Union, 2020 [cit. 2020-02-13]. Dostupný z: [https://www.epsu.org/sites/default/files/article/files/Survey%20on%20Health%20and%20Safety%20in%20the%20Circular%20Economy\\_CZ.pdf](https://www.epsu.org/sites/default/files/article/files/Survey%20on%20Health%20and%20Safety%20in%20the%20Circular%20Economy_CZ.pdf).

**Cíl dotazníku:** Evropa směřuje k cirkulární ekonomice, což znamená, že přechází od tradiční lineární ekonomiky (vyrobit, použít, vyhodit) k udržitelnějšímu modelu, který zachází s odpadem jako se zdrojem (redukovat, znovu použít, recyklovat). Přechod k lineární ekonomice ovlivňuje mnoho pracovníků v oblasti nakládání s odpady a čištění odpadních vod. Pracovní podmínky v těchto odvětvích mohou být složité a náročné a představují riziko pro zdraví a bezpečnost pracovníků. Jejich práce je stále často přehlížena a zdravotní a bezpečnostní aspekty přechodu k cirkulární ekonomice jsou nedostatečně prozkoumány. Aby byla mezera ve výzkumu vyřešena, vypracovala Evropská federace svazů veřejných služeb (EPSU) pro Výzkumnou organizaci pro veřejné služby (PSIRU) studii o zdraví a bezpečnosti v cirkulární ekonomice. Cílem tohoto průzkumu je doplnit sekundární výzkum a zajistit, že budou pracovníci v cirkulární ekonomice vyslyšeni a jejich odbory budou do konečné zprávy zahrnuti.

**ROŽIČOVÁ, Veronika. Optimalizace nakládání s vybranými druhy odpadů v nemocnici středního typu. Ostrava, 2019. Bakalářská práce. Vysoká škola báňská – Technická univerzita Ostrava, Hornicko-geologická fakulta Katedra environmentálního inženýrství. Vedoucí práce: Miluše Hlavatá. Dostupné online z:** [https://dspace.vsb.cz/bitstream/handle/10084/137439/ROZ0070\\_HGF\\_N2102\\_3904\\_T022\\_2019.pdf?sequence=1](https://dspace.vsb.cz/bitstream/handle/10084/137439/ROZ0070_HGF_N2102_3904_T022_2019.pdf?sequence=1).

Základní schéma textu diplomové práce zachovává rozdělení na dva spolu související celky, a to jednak na část zabývající se teoretickými záležitostmi dané problematiky a dále na část, která je věnována metodickým přístupům jejího řešení. V teoretické části je nejprve podán přehled platných legislativních předpisů, v nichž jsou ukotveny zásady nakládání s odpady ze zdravotnictví, včetně povinností jejich původců i oprávněných osob. Dále je v ní charakterizován současný stav odpadového hospodářství ve vybrané nemocnici středního typu a některé další aspekty nakládání a odstraňování produkovaných odpadů. V druhé části práce jsou pak na základě některých statistických údajů i posouzení aktuálnosti a účinnosti platného provozního řádu popsány návrhy na optimalizaci systému nakládání s odpady v dotčené

nemocnici (úprava provozního řádu, školení zaměstnanců, kompostování bioodpadů, dekontaminace infekčních odpadů). Na závěr práce je provedeno vyhodnocení těchto návrhů spolu s krátkou diskusí.

- **Klíčová slova:** legislativa, odpady ze zdravotnictví, systém nakládání s odpady, nemocnice, provozní řád, kompostování, dekontaminace

**WOZNICA, Jan. *Chemický odpad ve společnosti BORSODCHEM MCHZ, sro a možnosti jeho zpracování a využití.* Ostrava, 2019. Diplomová práce. Vysoká škola báňská – Technická univerzita Ostrava, Hornicko-geologická fakulta Katedra environmentálního inženýrství. Vedoucí práce: Barbora Lyčková. Dostupné online z:**

[https://dspace.vsb.cz/bitstream/handle/10084/120007/WOZ0010\\_HGF\\_N2102\\_3904\\_T022\\_2017.pdf?sequence=1](https://dspace.vsb.cz/bitstream/handle/10084/120007/WOZ0010_HGF_N2102_3904_T022_2017.pdf?sequence=1).

Práce se zabývá chemickými odpady ve společnosti BorsodChem MCHZ, s.r.o. se všemi jejich charakteristikami, složením i vlastnostmi. Dále je v práci zahrnut popis odpadového hospodářství a jeho jednotlivých složek a práce se také zaměřuje na procesy nakládání s jednotlivými vybranými odpady z této společnosti. V práci jsou popsány možnosti využití chemického odpadu a složek v odpadu obsaženém, které využít lze, a práce objasňuje také úpravu tohoto odpadu tak, aby mohl být znovu využit. Práce mimo jiné obsahuje experimentální část zaměřenou na znovuvyužití kalu z čiření vody, která zahrnuje všechny činnosti od odběru vzorků, přes provedení laboratorních analýz, získání hodnot vzorků, uložení na kalové pole, odebrání kalu specializovanou firmou, až po konečné znovuvyužití kalu jako hnojiva na rekultivaci krajiny postižené důlní činností.

- **Klíčová slova:** odpad, chemický průmysl, nebezpečné vlastnosti, nakládání s odpady, zpracování odpadů, využití odpadů, kal, spalování

## VOLNĚ DOSTUPNÉ ZDROJE – ZAHRANIČNÍ

**BLEWUSI, E. *Safety Practices and Perceived Health Implications on Waste Collectors in the Adentan Municipality of Accra* [online]. University of Ghana, July 2019 [cit. 2020-02-13]. Dostupný z:**

<http://ugspace.ug.edu.gh/bitstream/handle/123456789/33282/Safety%20Practices%20and%20Perceived%20Health%20Implications%20on%20Waste%20Collectors%20in%20the%20Adentan%20Municipality%20of%20Accra.pdf?sequence=1&isAllowed=y>.

**BACKGROUND:** Waste collection plays a vital role in the waste management process since it rids the environment of some health hazards. Waste collection however, has been known to expose waste collectors to some health-related problems, especially when they do not use the personal protective equipment that helps to prevent them

from being exposed to these health risks. **OBJECTIVES:** This study aimed to assess safety practices and perceived health implications among different groups of waste collectors in the Adentan Municipality of Accra. **METHOD:** This was a cross-sectional study with a mixed method approach. The quantitative component involved the administration of structured questionnaires to the waste collectors while the qualitative component involved in-depth interviews with purposively selected persons involved in the waste collection process and its management in the Adentan Municipality. A total of 90 participants took part in the quantitative component of the study while 12 participants were involved in the qualitative component. **RESULTS:** Results show that helmets were the least used safety equipment, with only 68% of the waste collectors reporting helmet use. On the other hand, the most used safety equipment were hand gloves which 92% of participants reported using. Other safety equipment participants reported using includes face masks (79%), goggles (70%), boots (78%) and safety clothing (83%). Most participants (82%) perceived respiratory diseases as one of the occupational health hazards associated with waste collection, followed by physical and musculoskeletal injuries or pains each scoring about 69%. However, only 54% perceived that they were prone to falls in line of their work. **Conclusion:** Waste collectors in the Adentan Municipality in Accra are aware of the occupational health hazards associated with waste collection in the city of Accra.

***Circular economy and health* [online]. World Health Organization, 2018 [cit. 2020-02-13]. Dostupný z:**

[http://www.euro.who.int/\\_data/assets/pdf\\_file/0004/374917/Circular-Economy\\_EN\\_WHO\\_web\\_august-2018.pdf?ua=1](http://www.euro.who.int/_data/assets/pdf_file/0004/374917/Circular-Economy_EN_WHO_web_august-2018.pdf?ua=1). ISBN 9789289053341.

The extensive use of natural resources threatens to exceed the carrying capacity of the Earth. The concept of a circular economy offers an avenue to sustainable growth, good health and decent jobs, while saving the environment and its natural resources. Further, the change from a linear economy (take, make, dispose) to a circular economy (renew, remake, share) is expected to support significantly the attainment of the Sustainable Development Goals (SDGs), particularly SDG 12 on responsible consumption and production. So far, however, the coverage of the health implications of a transition to a circular economy has been relatively limited. This report therefore aims to start to address this deficiency by framing the transition in a health context, to set the scene for further policy development, the assessment of research needs and stakeholder engagement in key health implications. It shows that the transition to a circular economy provides a major opportunity to yield substantial health benefits, such as direct benefits to health care systems and indirect benefits from reducing negative environmental impacts. There are also risks of adverse and unintended health effects, however, in processes involving hazardous materials, for example; circular economy strategies and particularly national, regional and local implementation plans need to be identified and address these risks.

- **Keywords:** CONSERVATION OF NATURAL RESOURCES ENVIRONMENTAL HEALTH ECONOMICS - TRENDS ENVIRONMENTAL

POLICY - TRENDS, ECONOMICS RECYCLING - TRENDS, ECONOMICS  
WASTE MANAGEMENT - TRENDS, ECONOMICS

***Circular economy meets environment and health: opportunities and risks*** [online]. World Health Organization, 09-10-2017 [cit. 2020-02-13]. Dostupný z: <http://www.euro.who.int/en/health-topics/environment-and-health/chemical-safety/news/news/2017/10/circular-economy-meets-environment-and-health-opportunities-and-risks>.

The WHO European Centre for Environment and Health hosted a meeting entitled “Circular Economy meets Environment and Health – Opportunities and Risks” on 4–5 October in Bonn, Germany. One of the objectives of this consultation was to facilitate the involvement and discussion of the health sector, with the main partners and actors dealing with the circular economy, and start the development of a consistent position for the health sector.

***Environmental and Social Impact Assessment Report Under Feasibility Study for Development of Utility Scale Solar PV & Wind Projects in Bangladesh: Final Report*** [online]. October 2018 [cit. 2020-02-13]. Dostupný z: <http://documents.worldbank.org/curated/en/449091539166909882/pdf/07102018-Final-ESIA-Report-of-Utility-Scale-PV-Wind-Project-cleared.pdf>.

Joint Venture of WindForce Management Services Pvt. Ltd. (India), Suntrace GmbH (Germany) and EQMS Consulting Limited has been appointed by “Power Cell”, Power Division, Ministry of Power, Energy and Mineral Resources for conducting the feasibility study for development of utility scale solar PV and Wind project in Bangladesh with the financial assistance by World Bank under the ongoing Rural Electrification and Renewable Energy Development II (RERED II) project. The ESIA study is an integral part of the feasibility study of the proposed project. This ESIA study report is prepared for the first 50 MW solar project on 165.5 acres land as well as solar and wind hybrid project along with aquaculture facility on rest of the acquired land based on the relevant World Bank safeguard policies and GoB guidelines.

**FERRONATO, Navarro; TORRETTA, Vincenzo. Waste Mismanagement in Developing Countries: A Review of Global Issues. *Int. J. Environ. Res. Public Health*** [online]. 2019, vol. 16, no. 6 [cit. 2020-02-13]. Dostupný z: <https://www.mdpi.com/1660-4601/16/6/1060/pdf>.

Environmental contamination due to solid waste mismanagement is a global issue. Open dumping and open burning are the main implemented waste treatment and final disposal systems, mainly visible in low-income countries. This paper reviews the main impacts due to waste mismanagement in developing countries, focusing on environmental contamination and social issues. The activity of the informal sector in developing cities was also reviewed, focusing on the main health risks due to waste scavenging. Results reported that the environmental impacts are pervasive worldwide:

marine litter, air, soil and water contamination, and the direct interaction of waste pickers with hazardous waste are the most important issues. Many reviews were published in the scientific literature about specific waste streams, in order to quantify its effect on the environment. This narrative literature review assessed global issues due to different waste fractions showing how several sources of pollution are affecting the environment, population health, and sustainable development. The results and case studies presented can be of reference for scholars and stakeholders for quantifying the comprehensive impacts and for planning integrated solid waste collection and treatment systems, for improving sustainability at a global level. View Full-Text

- **Keywords:** environmental contamination; public health; solid waste management; sustainability; open dumping; informal recycling; open burning; sustainable development; hazardous waste; risk assessment

**IVASCU, Larisa ...[et al.]. OSH - sustainability connection: innovation, education, and benefits. *MATEC Web of Conferences* [online]. 2019, vol. 290 [cit. 2020-02-13]. Dostupný z:**

[https://www.matec-conferences.org/articles/mateconf/pdf/2019/39/mateconf\\_mse2019\\_12017.pdf](https://www.matec-conferences.org/articles/mateconf/pdf/2019/39/mateconf_mse2019_12017.pdf).

The three responsibilities of the environment, society, and economy are used to model how sustainability can be incorporated into an organization's mission, goals, and practices. There are many worker problems embedded in the concept of sustainability. From the perspective of sustainable development, occupational health and safety (OSH) refers to promoting safety, security, health and welfare of workers. Using an integrated sustainability approach offers a way to rethink worker protection approaches and raises new exploration issues and innovation opportunities. This paper aims to present the connections between OSH and sustainable development taking into account the needs of the economic environment. It focuses on Safety and Health's Core Role in Sustainability. Researchers have also tried to advance the road to sustainable development through innovation and improvement of occupational and health security.

**POOLE, C. J. M.; BASU, J. Systematic Review: occupational illness in the waste and recycling sector. *Occupational Medicine* [online]. 2017, vol. 67, no. 8, s. 626–636 [cit. 2020-02-13]. Dostupný z:**

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5927023/>.

**Background:** The waste and recycling sector is a growing part of industry. Whether health surveillance is indicated and how it should be undertaken is unclear. **Aims:** To undertake a review of the literature to identify hazards to health, biological effects and occupational illnesses for workers in the sector. **Methods:** A systematic review of the published literature and two UK databases. **Results:** Rates of fatal, non-fatal injuries and self-reported work-related illness were found to be higher in the waste and

recycling sector than in UK industry as a whole. There was an increased prevalence of respiratory, gastro-intestinal and skin complaints in workers exposed to compost relative to controls. They may also be at increased risk of extrinsic allergic alveolitis, allergic bronchopulmonary aspergillosis, occupational asthma and abnormalities of lung function. Workers involved with the recycling of batteries and cables may be at risk of lead poisoning and exposure to other heavy metals. There were case reports of mercury poisoning from the recycling of fluorescent lights. Cases of occupational asthma have been reported in association with wood and paper recycling. The recycling of e-waste may cause exposure to heavy metals and organic pollutants, such as polybrominated diphenyl ethers, dioxins and polyaromatic hydrocarbons, which have been associated with damage to DNA and adverse neonatal outcomes.

**Conclusions:** Ill-health and adverse biological effects have been described in waste and recycling workers, but their true prevalence has probably not been captured. Targeted health surveillance may be required to assess exposure and to identify occupational illness.

- **Keywords:** Biological monitoring, health surveillance, recycling, systematic review, waste

**RADA, Elena Cristina; CESTARI, Irene; ROMANOVNA MAGARIL, Elena. Some considerations on circular economy, municipal solid waste and occupational risk. *MATEC Web of Conferences* [online]. 2020, vol. 305 [cit. 2020-02-13]. Dostupný z:**

[https://www.matec-conferences.org/articles/mateconf/pdf/2020/01/mateconf\\_sesam20\\_00068.pdf](https://www.matec-conferences.org/articles/mateconf/pdf/2020/01/mateconf_sesam20_00068.pdf).

The aim of the present article is to preliminarily analyse the effects that the introduction of the principles of circular economy can have on the occupational risk in the sector of MSW management. The chosen reference scenario concerns an Italian town that reached a very high efficiency of selective collection and where a lot of data have been generated in the last years to characterize the content of MSW. Since 2015, the town has to modify a few criteria of MSW management in order to fully comply with the vision of EU. The methodology adopted in the present article is based on the following steps. Details on the destination and material recovery were collected for each stream of MSW presently source separated: specifically, food waste and green waste, paper and cardboard, plastics, metals, glass, composite materials, textiles, expired medicaments, exhausted batteries and other. This scenario was analysed concerning new possible initiatives on source separated streams and their treatment (e.g. diapers). Moreover, additional modifications to the present approach were analysed in order to maximize material recovery, optimize energy recovery and minimize landfilling. Consequences of this reorganization of the sector have to be discussed in terms of occupational risk and economic impact.

**RAGAZZI, Marco ...[et al.]. Parameters analysis for a sustainable management of solid waste in university buildings. *MATEC Web of Conferences* [online]. 2020, vol. 305 [cit. 2020-02-13]. Dostupný z:**

[https://www.matec-conferences.org/articles/mateconf/pdf/2020/01/mateconf\\_sesam20\\_00054.pdf](https://www.matec-conferences.org/articles/mateconf/pdf/2020/01/mateconf_sesam20_00054.pdf).

Educational institutions and, specifically, university campuses are large energy consumers and waste producers. The impact of university campuses on the local waste management increases with decreasing the size of the city/town where universities are located. Following the growing interest of the scientific community on the research for strategies to improve the environmental sustainability of educational institutions, this paper aims at proposing specific parameters to 1) measure the performance of university buildings in waste management, 2) detect anomalous situations that require improvements and 3) implement ameliorative actions. Specifically, parameters like the per-capita or surface-specific waste generation could help identifying the structures that may require primary interventions. With reference to the case of a medium-size university, the paper points out the advantages of the punctual tariff system for waste management adopted by the local utility company and critically analyses its weak points. Overall, this system offers great opportunities for improving waste management and for cost savings, but requires careful management policies by public institutions.

**ROSALES RAMIREZ, Manuel. *Design, health and circular economy*. Espoo, 2019. Master Thesis. Aalto University, Department of Design. Vedoucí práce Mattelmäki, Tuuli. Dostupný online z:**

<https://aaltodoc.aalto.fi/handle/123456789/42651>.

Products generate waste in a linear value production model design. New sustainable design methods focus on using bio-materials and re-manufacturing processes to decrease waste and impact on the environment. Circular Economy models are sustainable because they aim to keep the value of a product at the end of their useful life. They reintegrate products in the chain instead of becoming waste and lose their value. However, circular models require an understanding of the big picture of business model ecosystems on what, who and how everyone closes the loop. Furthermore, the Internet of Things in product-service systems (PSS) requires the integration of diverse perspectives in their conception and design.

The objective of this thesis is to find a way to create circular PSS concepts in circular economy models through a collaborative design approach. The approach extracts the expertise of other areas to understand the real needs of all stakeholders to close the gap between design and business perspectives. It aims to understand what value means for each stakeholder, the implications of moving towards circular economy models, the impact on the product architecture, the technological trends opportunities and the experiences that the users and customers desire.

***Towards a Safe Circular Economy without Hazardous Chemicals* [online]. Swedish Society of Nature Conservation [cit. 2020-02-13]. Dostupný z:**

[https://www.naturskyddsforeningen.se/sites/default/files/dokument-media/towards\\_a\\_safe\\_circular\\_economy\\_without\\_hazardous\\_chemicals\\_0.pdf](https://www.naturskyddsforeningen.se/sites/default/files/dokument-media/towards_a_safe_circular_economy_without_hazardous_chemicals_0.pdf).

Circular economy has risen as a solution; a strategy to change the economy to become more sustainable. Instead of the linear economy of “take, make, dispose”, the idea is to reuse and recycle as much as possible, creating loops of products, materials and nutrition. While the idea of a circular economy basically is straight forward, it has some challenges. One of them, not often spoken of, is to get rid of hazardous chemicals in the loops. Otherwise, these chemicals will end up in consumer products and may cause health problems like cancer and reproductive and developmental disorders, as well as having negative impacts on the environment and the biodiversity. An adoption to a circular economy has the potential to lead to better health among workers and citizens - if the issue about hazardous chemicals is addressed.

**Waste and Circular Economy. *EU Science Hub* [online]. European Commission Last update: 06/09/2019 [cit. 2020-02-13]. Dostupný z:**

<https://ec.europa.eu/jrc/en/research-topic/waste-and-recycling>.

For a circular economy it is essential to recycle materials from waste in order 'to close the loop'. The recovery of energy from waste also plays an important role. Waste disposal should be phased out and, where it is unavoidable, it must be adequately controlled to be safe for human health and the environment.

As the EU has given priority to circular economy policies, the JRC has been providing research support on the waste-related aspects of the circular economy. To that end, it has been working with stakeholder experts in carefully structured and transparent consultation processes. The outputs include proposing end-of-waste criteria for certain waste streams, as well as safety and quality requirements for recycled materials; producing reference information on best available techniques and best practices; and carrying out techno-economic and environmental assessments of recycling processes, waste-to-energy options, and waste disposal operations.

***Will the circular economy be an economy with no workers?: new study published* [online]. European Public Services, 19 February 2018 [cit. 2020-02-13]. Dostupný z:**

<https://www.epsu.org/article/will-circular-economy-be-economy-no-workers-new-study-published>.

A report written by The Public Services International Research Unit (PSIRU) and commissioned by European Public Service Union (EPSU) investigates the impact of privatization and liberalization on waste services. The report highlights recent statistics surrounding waste management and explores challenges and benefits of moving towards a more circular economy.

**ODBORNÁ LITERATURA BEZ PŘÍSTUPU K PLNÉMU TEXTU (EBSCO)**

**ASIBEY, M. O.; AMPONSAH, O.; YEBOAH, V. Solid waste management in informal urban neighbourhoods. Occupational safety and health practices among tricycle operators in Kumasi, Ghana. *International Journal of Environmental Health Research*. 2019, vol. 29, no. 6, p. 702–717.**

The study examines the nature of activities and assess knowledge on occupational safety and health (OS&H) risks and practices among solid waste collectors in two low-income informal neighbourhoods in Kumasi (Aboabo and Asawase). Using observations and semi-structured interviews with 83 participants and relevant institutions, the findings indicate that informal tricycle waste collectors provided spot-to-spot waste collection using improvised sirens to signal their arrival. Workers generally had low knowledge, expressed less about occupational health risks, and thus adopted less safe work practices. The study however showed significant differences between knowledge of health risks ( $p < 0.000$ ,  $R = 0.83$ ) and years of working experience ( $p < 0.01$ ,  $R = 0.74$ ) and adoption of safe practices. Workers who had knowledge the associated health risks of the activity and also have been in the activity for more than 2 years were more likely to use at least one PPE/PPC. The study recommends that targeted interventions to mitigate risks and improve the health and safety of workers require effective risk communication. The study concludes that insight into OS&H is important to offer opportunities for better waste management strategies in the informal urban areas.

- informal waste collection, Occupational safety and health (OS&H), risk, solid waste management (SWM), tricycle (Aboboyaa), urban

**GUSMEROTTI, N. M. ...[et al.]. Drivers and approaches to the circular economy in manufacturing firms. *Journal of Cleaner Production*. 2019, vol. 230, p. 314–327.**

Much of the literature has investigated what the most innovative business models are in order to successfully implement circular economy principles within a company. However, the majority of modern companies are still based on traditional business models thus, it is important to study how to get these companies to adopt more circular practices. Data were collected through a questionnaire-based survey of 821 Italian companies. A cluster analysis was performed to classify their current level of implementation of the circular economy principles and a logit regression was carried out to identify the most effective drivers. Five clusters were identified: 1) "information-oriented companies" (24%), the best at communication and marketing-related activities, but the worst in relation to all the other aspects; 2) "linear companies" (41.6%), those that perform poorly in all five phases; 3) "green marketers" (15.5%), which perform well in relation to design, production and consumption; 4) "optimizers" (10.6%), which focus more on production and logistics and 5) "circular companies" (8.1%), those that register a good performance with respect to all aspects. The bad performers, clusters 1 and 2, also registered the worst economic results in the last three years, whereas the "circular champions" reported the best performance. Finally,

the logit regression showed that economic drivers were the most effective at encouraging "linear companies" to adopt more circular business models. On the other hand, no significant evidence was found of any influence exerted by the drivers related to regulatory pressure, resource exploitation risks, and the pursuit of environmental values. Image 108 • There is still a low level of circularity in most Italian manufacturing companies. • Economic drivers are the most important drivers of circular actions. • Regulatory pressures, resource exploitation risks and environmental value drivers are still ineffective.

**LAWRENCE, Kelly; COOPER, Vincent; KISSOON, MPriya. Sustaining voluntary recycling programmes in a country transitioning to an integrated solid waste management system. *Journal of Environmental Management*. March 2020, vol. 257, no. 1.**

Many developing countries are transitioning to integrated solid waste management systems that will likely have a recycling component for making them sustainable. There are several approaches to recycling, one being waste separation at the household level. Such an approach relies critically on the willingness of households to engage in source-separation. Many studies on recycling have been based on self-reported information on the willingness of households to participate in recycling programmes, should they be established; only few studies have been able to test what these intentions are by actual measurements of participation. The type of measurement for gauging success should be able to compare achievements against alternative approaches.

This study is of particular interest to transitioning countries because it reports on a recycling programme in a small community that, even though voluntary in nature, has so far been sustained for almost three years. Available data on the amount of recycled beverage containers retrieved over a six-month period was analysed to assess the performance of the programme. A survey of households was performed among the community to understand the factors that may be contributing to such longevity. It was found that a major driver is the internal motivation of most of the community households for caring and preserving the environment. This is a necessary but not sufficient requirement, for it is doubtful whether the programme could have been sustained without an effective education programme and a system to make the process of retrieval easy. The education programme importantly linked recycling as a solution to an environmental problem plaguing the community. Moreover, the improvement in the environmental quality once the programme started was positive feedback to their recycling efforts. However, the ease at which recycled items could have been deposited was found to be the most essential factor.

Inasmuch as the quantity of retrievals was a measure of the continued interest in recycling, a reliable estimate of the achieved fraction of beverage waste retrieval rates could not have been obtained with the most recent national waste characterization information. The reasons for this are explained.

**LONGHURST, P. J. ...[et al.]. Risk assessments for quality-assured, source-segregated composts and anaerobic digestates for a circular bioeconomy in the UK. *Environment International*. 2019, vol. 127, p. 253–266.**

A circular economy relies on demonstrating the quality and environmental safety of wastes that are recovered and reused as products. Policy-level risk assessments, using generalised exposure scenarios, and informed by stakeholder communities have been used to appraise the acceptability of necessary changes to legislation, allowing wastes to be valued, reused and marketed. Through an extensive risk assessment exercise, summarised in this paper, we explore the burden of proof required to offer safety assurance to consumer and brand-sensitive food sectors in light of attempts to declassify, as wastes, quality-assured, source-segregated compost and anaerobic digestate products in the United Kingdom. We report the residual microbiological and chemical risks estimated for both products in land application scenarios and discuss these in the context of an emerging UK bioeconomy worth £52bn per annum. Using plausible worst case assumptions, as demanded by the quality food sector, risk estimates and hazard quotients were estimated to be low or negligible. For example, the human health risk of *E. coli* 0157 illness from exposure to microbial residuals in quality-assured composts, through a ready-to-eat vegetable consumption exposure route, was estimated at  $\sim 10^{-8}$  per person per annum. For anaerobic digestion residues,  $7 \times 10^{-3}$  cases of *E. coli* 0157 were estimated per annum, a potential contribution of 0.0007% of total UK cases. Hazard quotients for potential chemical contaminants in both products were insufficient in magnitude to merit detailed quantitative risk assessments. Stakeholder engagement and expert review was also a substantive feature of this study. We conclude that quality-assured, source-segregated products applied to land, under UK quality protocols and waste processing standards, pose negligible risks to human, animal, environmental and crop receptors, providing that risk management controls set within the standards and protocols are adhered to. Unlabelled Image • Quality assured, source-segregated composts and digestates have agronomic benefits. • Removal of these wastes from regulation requires prior risk assessment. • Risks to humans, animals, crops and the environment are negligible, assuming controls in place. • Products from these wastes play an important role in a circular bioeconomy. • The burden of proof to secure market confidence however is substantive.

**MILIOS, L. ...[et al.]. Sailing towards a circular economy: conditions for increased reuse and remanufacturing in the Scandinavian maritime sector. *Journal of Cleaner Production*. 2019, vol. 225, p. 227–235.**

The transition to a Circular Economy (CE) requires enabling conditions that remove existing barriers in product life extension and material recovery operations. This contribution investigates barriers to material resource efficiency strategies in the maritime sector in Scandinavia and discusses the potential of policy interventions to enable increased reuse and remanufacturing of ship components. Recycling is a widespread practice in the maritime industry; however, ship demolition is usually associated with poor health and safety conditions for workers and adverse effects on

the environment. According to CE principles, recycling is not the most favourable option for end-of-life products. Operations such as reuse and remanufacturing can be used to prolong the lifetime of marine equipment and delay the inevitable stage of recycling, thus contributing to significant material resource savings and value savings in the form of labour and energy. Yet, reuse and remanufacturing rates in the maritime sector are low compared to other sectors such as aviation and automotive. To identify the reasons behind this, interviews with stakeholders in the maritime sector revealed the main barriers for adopting reuse and remanufacturing strategies. These include (1) high costs that prohibit the uptake of reused and remanufactured components; (2) a lacking and inconsistent policy framework; and (3) the absence of organisational competences to facilitate reuse. To help overcome these barriers, a set of policies is discussed and their acceptance within the industry is examined. Potential policy interventions include (1) lower labour taxation; (2) enhancing waste infrastructure that distinguishes collection for reuse; and (3) mandating information and standardisation procedures.

**PÄÄKÖNEN, Rauno; KOPONEN, Milja. Trends in occupational hygiene in Finland. *International Journal of Occupational Safety and Ergonomics*. 2019, vol. 24, issue 1.**

The aim of this work is to evaluate and describe the current status of, and prospects for, the future of occupational hygiene in Finland. The main sources of information include a seminar held in the annual meeting of Finnish Occupational Hygiene Society and interviews with different stakeholders. Nanotechnology and other new materials, changing work environments, circular economy including green jobs, new medical methods and advances of construction methods were recognized as future challenges. Future work opportunities for occupational hygiene experts included exposure assessments in indoor air surveys, private consulting and entrepreneurship in general, international activities and product safety issues. Unclear topics needing more attention in the future were thought to be in new exposures, sensitive persons, combined effects, skin exposures and applicability of personal protective equipment. Occupational hygiene should broaden its view; occupational hygienists should have to cooperate with other specialists and grasp new challenges.

- **Keywords:** occupational hygiene, physical, chemical and biological factors, work environment

**PALMER-JONES, D. At the sharp end. *Safety & Health Practitioner*. 2014, vol. 32, no. 12, p. 47.**

The article looks into the occupational health and safety challenges posed by waste management under a circular economy, which is expected to resolve resource scarcity/security issues and drive resource productivity in Great Britain. These challenges include the expansion of laborers engaged in materials sorting and segregation and increase in injury rate or fatality. It highlights the initiatives of the

Environmental Services Association (ESA) to reduce accidents and improve health and safety.

**SCHROEDER, P.; ANGGRAENI, K.; WEBER, U. The Relevance of Circular Economy Practices to the Sustainable Development Goals. *Journal of Industrial Ecology*. 2019, vol. 23, no. 1, p. 77–95.**

This paper identifies the extent to which circular economy (CE) practices are relevant for the implementation of the Sustainable Development Goals (SDGs). The results of a literature review and a matching exercise to determine the relationship between CE practices and SDG targets show that CE practices, potentially, can contribute directly to achieving a significant number of SDG targets. The strongest relationships exist between CE practices and the targets of SDG 6 (Clean Water and Sanitation), SDG 7 (Affordable and Clean Energy), SDG 8 (Decent Work and Economic Growth), SDG 12 (Responsible Consumption and Production), and SDG 15 (Life on Land). The paper also explores synergies that can be created through CE practices among several of the SDG targets. Furthermore, it identifies several potential trade-offs between targets for decent work, safe working environments, human health and current CE practices relating to recycling of municipal waste, e-waste and wastewater, and provides suggestions how these can be overcome. The paper concludes that CE practices can be applied as a "toolbox" and specific implementation approaches for achieving a sizeable number of SDG targets. Further empirical research is necessary to determine which specific types of partnerships and means of implementation are required to apply CE practices in the SDG context.

**STAHEL, Walter R. Innovation in the circular and the performance economy. In: *Handbook of Sustainable Innovation*. Cheltenham: Edward Elgar Publishing Limited, 2019. ISBN 9781788112567.**

The circular industrial economy is about maintaining the value of manufactured assets at their highest level over the longest possible time. It manages stocks of objects and molecules through the era of 'R' – reusing, repairing and remanufacturing objects at highest use quality; and the era of 'D' – recovering atoms and molecules of highest purity. The circular industrial economy is a regional economy that substitutes labour for energy, prevents waste and emissions, and provides high resource security on a corporate and national level. The circular industrial economy is sustainable because it is economically competitive with manufacturing, creates a broad variety of jobs of all skill levels, and minimizes resource consumption and the need for transport and packaging. Economic actors that manage fleets of objects and sell their performance – by retaining ownership and renting or leasing them – in addition, internalize costs of risks and liability over the full life-cycle of objects.

**YADAV, G. ...[et al.]. Development of a lean manufacturing framework to enhance its adoption within manufacturing companies in developing economies. *Journal of Cleaner Production*. 2020, vol. 245.**

The urgent need to reduce negative corporate environmental impacts while enhancing their financial strength and positive societal benefits is attracting company leaders to implement various quality improvement systems such as lean manufacturing, six sigma, sustainable manufacturing, and circular economy concepts, approaches and technologies. All of these approaches are valuable, with Lean Manufacturing (LM) among the leading systems, if implemented within an appropriate framework. In that context, the objective of the authors was to document the drivers for improving implementation of LM within manufacturing companies. Implementation of LM practices is already providing competitive advantages such as improvements in product quality, productivity, worker health and safety and customer satisfaction in developed countries but has not been widely implemented in companies in developing countries. To help to enhance implementation of LM in developing countries, the authors developed a framework for enhancing the adoption of lean manufacturing processes in such companies. The hybrid Fuzzy Analytical Hierarchy Process (FAHP)-Decision Making Trial and Evaluation Laboratory (DEMATEL) tools were used as the framework to identify and to quantify the interrelationships among the drivers for implementation of LM. This hybrid approach facilitated documentation of the relative importance and priority of the thirty-one lean manufacturing drivers. The results revealed that improved shop-floor management, quality management, and manufacturing strategy drivers were among the most critical drivers, which enhance LM adoption. These findings are beneficial for company leaders and researchers working to improve environmental, economic and societal health, especially within companies in developing countries. Image 1 • Studied existing Lean Manufacturing (LM) frameworks. • Proposed LM framework to enhance its adoption. • Documented drivers of LM among the manufacturing industries of emerging economies. • Implemented the developed framework in a pump manufacturing organisation. • Documented improvements in organisational performance metrics.

**WRIGHT, C. Y. ...[et al.]. Circular economy and environmental health in low- and middle-income countries. *Globalization & Health*. 2019, vol. 15, no. 1, p. 1–5.**

The circular economy framework for human production and consumption is an alternative to the traditional, linear concept of 'take, make, and dispose'. Circular economy (CE) principles comprise of 'design out waste and pollution', 'retain products and materials in use', and 'regenerate natural systems'. This commentary considers the risks and opportunities of the CE for low- and middle-income countries (LMICs) in the context of the Sustainable Development Goals (SDGs), acknowledging that LMICs must identify their own opportunities, while recognising the potential positive and negative environmental health impacts. Main Body: The implementation of the CE in LMICs is mostly undertaken informally, driven by poverty and unemployment. Activities being employed towards extracting value from waste in LMICs are imposing environmental health risks including exposure to hazardous and toxic working

environments, emissions and materials, and infectious diseases. The CE has the potential to aid towards the achievement of the SDGs, in particular SDG 12 (Responsible Consumption and Production) and SDG 11 (Sustainable Cities and Communities). However, since SDG 3 (Good Health and Well-Being) is critical in the pursuit of all SDGs, the negative implications of the CE should be well understood and addressed. We call on policy makers, industry, the health sector, and health-determining sectors to address these issues by defining mechanisms to protect vulnerable populations from the negative health impacts that may arise in LMICs as these countries domesticate the CE. Conclusion: Striving towards a better understanding of risks should not undermine support for the CE, which requires the full agency of the public and policy communities to realise the potential to accelerate LMICs towards sustainable production and consumption, with positive synergies for several SDGs.

**ZOLNIKOV, Tara Lara ...[et al.]. Ineffective waste site closures in Brazil: A systematic review on continuing health conditions and occupational hazards of waste collectors. *Waste Management*. October 2018, Volume 80, Pages 26-39.**

There are approximately 15 million people engaged in waste collection or recycling activities in the world. Some of these dump sites are informal and people work in environments that are labor-intensive, unregulated, unregistered, low-paid, unrecorded, and environmentally hazardous. A systematic review was conducted to assess consequential health conditions and occupational risks that affect waste collectors in Brazil. The search was limited to Brazil because although the government closed dump sites, open-air dumping—the worst type of waste disposal—still occurs in about half of the country; moreover, Brazil is the only country to systematically collect data on the occupation, with an estimated 229,568 recyclable collectors of all types country-wide, which offers relevant and pertinent data on the topic. The results of the search indicated that nearly every region has individuals that work as recyclable collectors. As expected, the sites are full of occupational hazards to the workers that can include: long working hours; exposures to physical, chemical, mechanical, biological, ergonomic and social agents; and frequent work accidents. Exposure to these risks can result both in physical and psychological illnesses. In view of these findings, public policies could be strengthened by supporting and providing incentives to municipalities, schools, universities, health professionals, and all others who will contribute to the closure of open-air waste or poor waste disposal systems. Moreover, an improved awareness should be provided to the general population about environmental education and correct disposal of garbage. The goal of healthy waste disposal conditions ultimately decreases environmental and public health effects, while improving the working conditions, quality of life, and health outcomes for recyclable collectors.