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Carbon Capture, Employment, and Coming Home from Prison

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ABSTRACT

Finding and securing employment is a huge challenge for those who have been released from prison. In this paper, we argue that carbon capture technology carries the unique potential to positively impact employment opportunities for those who are undergoing the reentry process. Notably, these careers exist nearly entirely in industries which already employ ex-felons. If carbon capture technology were implemented throughout the United States, our estimates suggest that ex-felons would be eligible for nearly 3.6 million careers. Many of these jobs would be created in industries which directly or indirectly support natural resource extraction, ethanol production, electricity generation, and iron, steel, and cement production. In addition to benefiting the economy, these careers would provide returning individuals with financial security and supportive, prosocial peer relationships. Accordingly, carbon capture carries the unique ability to promote environmental justice while simultaneously providing relief to a tremendously overburdened criminal justice system.

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Introduction

As an academic field, criminology is tasked with offering explanations to the correlates and causes of an extensive array of different forms of deviant behavior and crime. The conceptual differences in the etiology of such a wide variety of outcomes has led to the development of a number of different – and often competing – theoretical perspectives (e.g., Gottfredson and Hirschi 1990; Sutherland 1947). As criminological research has expanded in conjunction with the ongoing development of theory, different predictors and situational contexts have been realized as being of considerable importance into the initiation, maintenance, and desistance from crime. While significant advances in this work have considerably aided the explanation of deviance (see Piquero, Farrington, and Blumstein 2003; Weisburd and Piquero 2008 for an overview), the constant search for new ways of thinking about how various factors may relate to crime, recidivism, incarceration, and reincarceration serves as an ongoing reminder that criminologists have considerable difficulty explaining human behavior.

As a response to relatively low explained variance statistics (see Weisburd and Piquero 2008), criminologists have bolstered the field's sociological underpinnings with concepts from other fields of science. Found throughout criminological theories (e.g., Burgess and Akers 1966), perhaps the most common field of academia from which criminologists borrow is psychology. However, other fields of science have been incorporated into criminology to aid in the explanation of a variety of crimes, including – but not limited to – epidemiology (Waltermauer and Akers 2013; also see Farrington and Jolliffe's special issue of *Aggression and Violent Behavior* [2017]), biology (e.g., Beaver, Barnes, and Boutwell 2015), and sustainability (e.g., Gibbs et al. 2010). Many of these advancements have been

extraordinarily beneficial to criminology as they offer the ability to look at crime through a different lens, thereby contributing to the ‘accumulation of knowledge.’

In this study, we build upon a growing heritage of interdisciplinary concepts and collaborations in criminology by proposing that the science behind carbon capture technology offers another viewpoint of value to thinking about crime causation. Our central argument is that the implementation of carbon capture technology carries the unique potential of providing careers for ex-felons. In turn, these careers carry the ability to drive down recidivism (the recommitting of crime after one has been convicted) by offering opportunities for prosocial interpersonal development, financial security, and stability – three things that are currently lacking from the job opportunities of most people when they get out of prison.

Like others, we define carbon capture as the process through which carbon dioxide emissions (CO₂) – some of the most common air pollutants – are captured and stored so they are not released into the atmosphere (see IPCC 2005). Tracing back to the philosophical roots of carbon capture technology, carbon capture has the potential to meet increasing global demand for industry regulations (see Wilson, Julio Friedmann, and Pollak 2007) while promoting social justice (see Bickerstaff, Walker, and Bulkeley 2013), environmental justice (Hardisty, Sivapalan, and Brooks 2011), and sustainability (see Szulczewski et al. 2012; also Hardisty, Sivapalan, and Brooks 2011). Carbon capture also is closely tied to a tremendous potential for job creation and economic development. In the decade spanning the years of 1997 to 2007, there were over 1,134,000 jobs were created in only one state – California – in the realm of energy conservation (Roland-Holst 2008: 25–29; also Mundaca and Richter 2015).

It is in the latter of these arenas – career creation – where carbon capture intersects with the study of crime. Carbon capture technology carries a uniquely impactful benefit to those who are invested in studying crime during a process called ‘reentry.’ Reentry describes a period of time immediately after release from prison during which a formerly incarcerated person reintegrates back into the community (see Davis, Bahr, and Ward 2012). Despite release from prison being an exciting experience, reentry is a difficult time period for most people (see Maruna 2001; Western et al. 2015). This is perhaps most clearly demonstrated by the fact that over two thirds of people who are released from prison in the United States will return to prison at some point in their lives (Petersilia 2001). In the midst of extremely high return-to-prison rates is a key – if not *the* key – problem presented to people during reentry: Finding and securing employment. Although employment is widely recognized as a key component to avoiding the extremely high risk of reincarceration, the unfortunate, current reality in the United States is that “many [returning people] will face a difficult path in finding and keeping employment” (Visser et al. 2011: 712).

As we will outline in this study, carbon capture technology has the ability to create and support numerous additional careers in the United States in industries which have long histories of successfully employing formerly incarcerated persons. In this study, we review employment statistics of several industries which already are extensive employers of ex-felons. In the process, we emphasize that adopting carbon capture technology into these industries would be a boon for not only social and environmental justice, but also the criminal justice system. Prior to discussing specific numbers, however, we review the current state of the research on employment for those who are navigating the reentry process. Collectively, it is the goal of this study to argue one central point: Due to its potential sweeping benefits to the formerly incarcerated, carbon capture technology could potentially represent a ‘turning point’ in the study of crime by providing a large number of careers which are eligible to people undergoing the reentry process.

Navigating employment during reentry

With incarceration numbers in the United States recently peaking at all-time highs (see Shannon et al. 2017), more people than ever are being released from prison every day. The number of people of being released on a daily basis has recently surged as a result of a steadily increasing number of mandates

from federal and state courts to reduce prison and jail populations in a variety of places across the United States (e.g., state of California, city of Toledo, Ohio, etc.). Despite the means through which a formerly incarcerated person is released, the period of reintegration back into the community is challenging. In addition to frequently facing challenges in securing housing, transportation, and securing a basic income (Harding et al. 2011), those who are undergoing the reentry process have to cope with the challenges of managing relationships with friends who remain active in lengthy criminal careers (Visser, La Vigne, and Travis 2004) and dealing with unanticipated, but persistent, conflict with family members (Naser and Visser 2006). For these reasons, research has come to the realization that release from prison represents a turning point in life (Kirk 2012).

In the midst of all of these rapidly unfolding challenges in the reentry process, those who have recently been released from prison need jobs. While some people simply need a job to try to earn a basic income (e.g., Freudenberg et al. 2005), others are required to have a job or be actively seeking one as a condition of release (i.e., parole; see Bushway and Apel 2012). Despite this, people who are released from prison are often highly motivated to change (Bushway 2003), and they perceive employment as the critical factor that can protect them against recidivism (Graffam et al. 2004).

There is an active debate over whether employment yields the benefits it is assumed to offer to returning people. Amid questions over whether employment does (Hardisty, Sivapalan, and Brooks 2011) or does not (Ramakers et al. 2017) protect against recidivism and reincarceration, criminologists lack a clear picture on the role of employment for returning people. Part of the reason for this likely lies in the distinction between a 'job' and a 'career.' Mallar and Thornton (1978) delineate that 'jobs' are often transitory, unskilled labor positions which offer little to people in terms of sustaining a livable wage, offering benefits of healthcare or childcare, or providing hours which are conducive to successfully reintegrating into society while balancing other obligations during the reentry process. On the other hand, 'careers' offer stability, livable wages, benefits, and hours which allow those who have been released from prison to reassume a normal schedule. Without technologies and new opportunities such as carbon capture, the unfortunate current reality in the United States is that ex-felons are generally more eligible for jobs than they are careers. However, the implementation of carbon capture technologies – as we will argue in the next sections of this study – could provide a new pathway to suitable 'green' careers and redefine the nature of employment during the reentry process.

Employment after prison is even more difficult considering that many who are released from prison come from backgrounds fraught with severe structural disadvantage (Segall 2011). In addition to having poor quality education (Sesha and Falcone 2007), coming from impoverished neighborhoods bereft of collective efficacy (Lyons and Lurigio 2010), and a lack of financial capital (Mills and Codd 2008), people who are released have a sordid history of finding gainful employment. Examining the employment trends of 740 men across several states who had been out of prison for two months, Visser, Debus, and Yahner (2008) found that only 43% of people had been successful in finding a job. Of those who had employment, 27% were employed in general manual labor, 12% in maintenance, and 12% percent in factory jobs (Visser, Debus, and Yahner 2008). With a median wage of 8.00 USD per hour, it is no surprise that half indicated dissatisfaction with the pay they were receiving. Six months later, follow up interviews demonstrated that 65% had been of the sample had been employed at some point. The most common type of job was manual labor (24%), food services (12%), and maintenance (10%), and workers received a median pay of 9.00 USD per hour. Informal, 'under-the-table' jobs like automotive work and lawn maintenance were also overwhelmingly common, with nearly half reporting income from these jobs after release.

In Visser, Debus, and Yahner (2008: 3–7) study, wage earnings shared a robust and significant negative relationship with reincarceration. This finding indicates that the relationship between employment and recidivism is more complicated than whether someone simply 'has' a job. Instead, wage earnings are independently important, and Visser and colleagues (p. 7) call on researchers to study this relationship in more detail.

What is perhaps most alarming regarding wage earnings is that more than half of the people in the sample used by Visser, Debus, and Yahner (2008) were dissatisfied with the wages they were receiving

(51%). This is even more concerning considering that estimates suggest that one in every 15 working-age, American adults has a felony record (Visser, Debus, and Yahner 2008; see also Schmitt and Warner 2011). Based on calculations from population demographics and prison population data, Visser and colleagues explicitly state that this means that somewhere between 12.3 to 13.9 million Americans currently employed in the workforce have a felony record. If these trends from 2008 were to remain consistent today, this would mean that 6.27 to 7.09 million ex-felons in the American workforce feel that they are not only underpaid but are also at extremely high risk of reincarceration due to being underpaid.

In addition to having a slew of barriers to employment for people who have been released from prison (e.g., background checks, transportation concerns, etc.), low wage earnings and low-skill, “dead end” jobs may actually contribute to higher recidivism rates. In “dead-end” jobs, people often have difficult hours (e.g., the third shift), low hourly pay, little or no chance of upward mobility, and little to no ability to utilize their unique talents and abilities (Mosthaf, Schnabel, and Stephani 2010). Collectively, these factors all contribute to working environments which are conducive to high employee turnover and instability.

When there is a high turnover of employees, there is inherently limited opportunity for people returning from prison to develop, create, and/or maintain healthy, prosocial relationships with other people who are committed to maintaining gainful employment. For those who are returning home, jobs that drive high turnover may actually impose a barrier to forming prosocial peer relationships due to a system that offers few opportunities, pay, time flexibility, and employment security to those who are reintegrating into society. Being that emerging evidence in the reentry research suggests that supportive relationships with prosocial peers offer robust and meaningful protective barriers to people who are returning home from prison (Boman and Mowen 2017), being employed in jobs like this may be doing returning people a disservice by removing one of the few protective factors that exist for them during a particularly trying time in their lives.

Figure 1 provides a conceptual diagram of the process which people face when they are released from prison. After a formerly incarcerated person is released from prison, they are required to seek employment. Despite this, unskilled labor jobs which offer little in the way of career security are overwhelmingly common. Furthermore, these jobs may restrict an ex-felon’s social network by increasing ties to others who are not invested in their work in high turnover jobs. As a result, returning people are restricted in their abilities to create prosocial relations with people who are invested in their careers. Instead, unskilled labor-based jobs (which are not amenable to being careers) can potentially detrimentally impact those who are returning home from prison and both a direct and indirect way. While a direct effect from skill-based jobs to recidivism likely exists on its own, an indirect pathway between unskilled labor-based jobs and recidivism which realizes the impact of damaged opportunities for prosocial peer relationships is also likely.

Carbon capture’s contribution to employment during reentry

Due to the multifaceted uses of carbon and its implementation in various industries, carbon capture technology has the potential to drive employment opportunities. At the most basic level, there must be a release of carbon to implement carbon capture technologies. The top industries which emit CO₂ are ethanol plants, cement, steel, and iron refineries, electricity generation, and industrial uses with respect to carbon conversion (Folger 2018). As carbon capture technology has progressed and developed, it offers industries the opportunity to be more environmentally friendly and is economically incentivizing. It was estimated that 2.3 million American jobs exist in the specified industries which utilize carbon capture technology (U.S. Department of Energy [DOE] 2017). The implementation of this technology at a widespread level would create numerous manufacturing, welding, steel, agriculture, cement, construction, industrial technology, and machining careers in the United States (for a comprehensive list of industries which would add jobs, see Roland-Holst 2008). And, as we have demonstrated, ex-felons are eligible for many of these jobs.

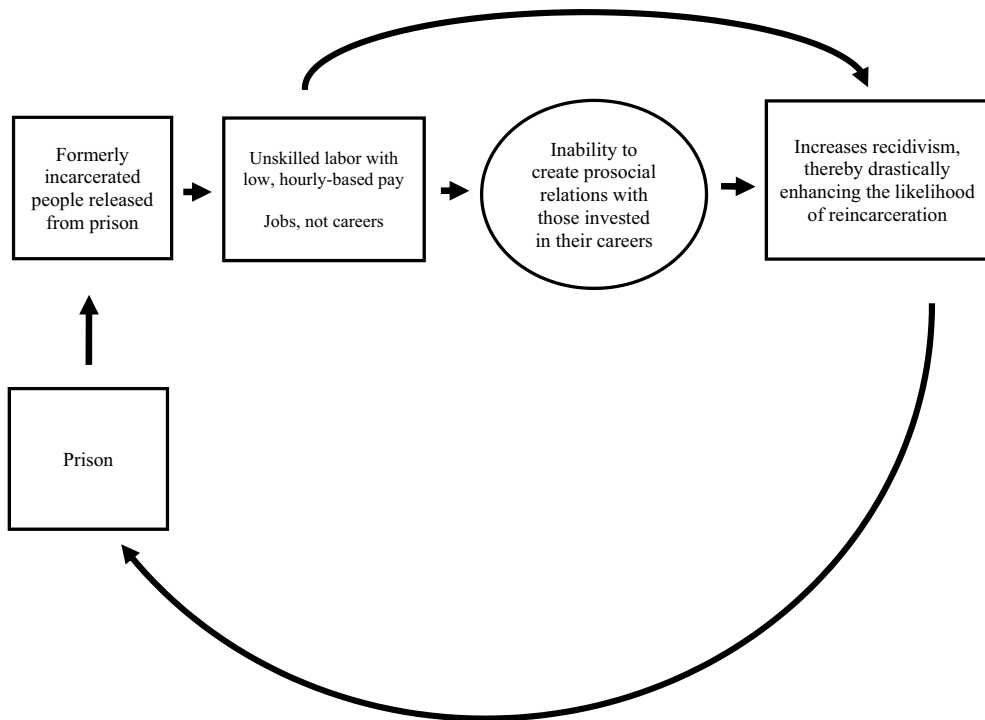


Figure 1. A structural diagram demonstrating the barriers to employment that those being released from prison currently encounter: carbon capture not integrated into the reentry process.

As industries find innovative ways to capture carbon, large financial benefits to storing carbon emissions have appeared. Robust economic gains from carbon capture technology and implementation in recent years have formed strong bipartisan support for carbon capture as a mechanism not only to reduce CO₂ emissions, but also fuel the economy by benefitting the pocketbooks of industries which burn fossil fuels via tax incentives. The 45Q tax credit is an ideal example of the bipartisan support behind carbon capture technology. The 45Q gives tax credit to companies which are actively capturing and storing carbon, and has been supported by both the Obama and Trump Administrations. While the updated 45Q tax credit will offer higher credit for the capturing and storage of CO₂, this tax credit works similarly to wind tax credits offered during the Obama Administration. Ultimately, carbon capture technology will make carbon storage monetarily feasible for companies by incentivizing its capture by the metric ton (Jossi 2018). Given the broad and increasing support for carbon capture, we proceed by reviewing the career creation potential for ex-felons in the industries that will be impacted by carbon capture the most.

Natural resource extraction

The natural resource industry supplies a wide variety of industries and thus has a tremendous amount of job opportunities. At the end of the first quarter of 2019, careers in natural resource extraction (mineral solids, liquid minerals, petroleum, and gasses) employed an estimated 709,900 people (seasonally adjusted), with an average hourly wage earning of 33.89 USD per hour (U.S. Bureau of Labor Statistics 2019). Since carbon capture technology has the potential to make our current usage of fossil fuels cleaner, it will serve to promote the extraction of natural resources (e.g., coal, oil, natural gas). That is, jobs will be created as carbon capture technology is utilized more in industry due to the technology making the continued extraction of natural resources more viable.

The benefits of carbon capture experienced by the fossil fuel industry will trickle down to positively impact formerly incarcerated felons in the form of skill-based careers. Amid a heavy reliance on fossil fuels in the United States, fossil fuel extraction is economically beneficial for creating careers in energy production and transportation. Notably, ex-felons are already employed in both of these industries. Furthermore, a large proportion of natural resource extraction jobs (manual labor, maintenance, and factory work) meet the requirements for what ex-felons are seeking and qualified.

Ethanol plants

The jobs offered in the ethanol industry would significantly benefit ex-felons who regularly seek jobs in manual labor, maintenance, and factory work (see Visser, Debus, and Yahner 2008: 3–7). In the United States, the ethanol industry is extensive, and production today only continues to grow (U.S. Energy Information Administration [EIA] 2017a). As of 2019, there were 210 ethanol plants spanning across 27 states. These facilities produce an estimated 16.1 billion gallons of ethanol (Powered With Renewable Energy [PWRE] 2019). In 2018, the ethanol industry employed 71,367 American workers, and indirectly supported an additional 294,516 workers across various sectors and industries (PWRE 2019). This is a substantial number of careers in the American workforce, many of which ex-felons are qualified to fill.

Carbon capture technology would be a major benefit to the ethanol industry and could potentially be incorporated in a majority of these 210 ethanol plants. Brad Crabtree, the Great Plains Institute's Vice President and 45Q tax credit proponent, stated, "I think there will be a huge incentive to install CO₂ compression equipment at ethanol plants to reduce its carbon footprint and companies could use the tax credit to invest in pipelines linked to oil producers and underground storage" (Jossi 2018). Ultimately, this would create many more skilled careers, many of which would be quite attractive to formerly incarcerated people.

Electricity generation

The traditional energy sector (i.e., electric power generation, fuels, transmission, distribution, and storage) employs a large amount of people, and carbon capture is an instigator which could increase the size of the workforce. It is estimated that approximately 2.4 million Americans have jobs in the transmission, distribution, and storage industry (National Association of State Energy Officials [NASEO] 2016). Despite not having an exact number of formerly incarcerated people employed in this industry, the beneficial impacts would trickle down to returning people on a large scale. With such a broad number of people employed, this industry offers stability and growth opportunities in skill-based careers. These are the types of jobs ex-felons are seeking and rely on to rebuild a meaningful life after they are released from prison.

A specific example of an electric generation company utilizing carbon capture technology is Petra Nova, a coal-fired power plant located in Texas. The technology that Petra Nova is utilizing for carbon capture is estimated to be 90% efficient at capturing CO₂. The captured carbon is transported to barren oil fields for enhanced oil recovery practices (U.S. EIA 2017b). The technology implemented in this specific operation, the maintenance to maintain optimal performance, and the transportation of captured CO₂ are all careers that ex-felons are qualified to fill.

Iron/steel/cement refineries

Current estimates suggest that there are approximately 374,500 people employed in iron, steel, and steel product manufacturing (DataUSA 2019; see McBride 2018). In addition, there are currently an estimated 14,024 people employed in the cement manufacturing industry (IBISWorld 2019). Adding these figures together, there are around 388,524 careers within the three industries. With the implementation of carbon capture, these industries could offer many new potential career opportunities for

Table 1. Number of people employed by key industries which employ formerly incarcerated persons.

Industry	Direct Careers	Indirect Careers	Total
Natural resource extraction ^a	709,900	Not Avail.	709,900
Ethanol plants ^b	71,367	294,516	365,885
Electricity generation ^c	2,400,000	Not Avail.	2,400,000
Cement, steel, and iron refining ^d	388,524	Not Avail.	388,524
Totals	3,569,791	294,516	3,864,307

^aU.S. Bureau of Labor Statistics (2019).
^bPWRE, (2019).
^cNASEO 2016).
^dsee DataUSA, (2019); also IBISWorld (2019).

ex-felons. Notably, all three industries are responsible for a large amount of CO₂ release. By implementing carbon capture technology, a framework of careers would be expanded in manufacturing, distribution, installation, maintenance, and transportation. These industries are already consistent employers of formerly incarcerated persons. Thus, these steady careers would help the environment, improve social justice, and would carry the added bonus of providing careers to those who need them the most – the formerly incarcerated. This would carry the unseen advantage of reducing recidivism rates and easing strain on an overburdened criminal justice system.

Synopsis

Table 1 displays the current (2018 and 2019) number of people employed within industries which employ people recently released from prison. As we have argued, each industry in Table 1 has the ability to implement carbon capture technology within production and/or operation. There are approximately 3,864,307 people employed, either directly or indirectly, within these industries. However, this number is conservative due to the difficulties of defining and categorizing direct and indirect employment for industrial careers (see U.S. DOE 2017).

With nearly four million people employed within industries that a widespread implementation of carbon capture would benefit, the trickle-down effect to formerly incarcerated individuals would be enormous. With carbon capture implementation, new opportunities would come to fruition that would promote massive career creation for previously incarcerated individuals, increase economic outlet opportunities, and hinder carbon emissions – all of which will promote social and environmental justice. Viewing green technology in this light highlights the intersection of the sciences and underscores the ability of carbon capture to help resolve deeply rooted environment and social injustices and structural inequality.

Discussion and conclusions

During the process of returning home from prison, people desperately need jobs. In addition to securing a job frequently being a condition of parole, the reality is that people who are released from prison rely on a dependable income (e.g., Visher et al. 2011). However, the difficulties faced in securing a career are evidenced by a recidivism rate of 59% (Shannon et al. 2017), highlighting an alarming reality: Most people who are released from prison will return there within three years time. In a proposed remedy to this issue, this study has argued that there is a relatively unrealized, intricate link between reentry careers, recidivism rates, and carbon capture technology. If carbon capture technology were to be implemented, it would boost careers in industries that have long histories of successfully offering careers to ex-felons. While it is widely recognized that carbon capture could provide a huge boost to environmental justice, reduce global warming (e.g., Cox et al. 2000), and increase public health (e.g., Haines et al. 2009), we focus our final remarks on the impact that carbon capture could have on social justice, recidivism, and the criminal justice system.

When people are released from prison, there is currently a cycle negatively impacting formerly incarcerated persons face when seeking employment (refer to [Figure 1](#)). For those undergoing the reentry process, the struggle with finding gainful employment is exacerbated by a wide variety of different challenges and life circumstances (see [Western et al. 2015](#)). Released persons are challenged with few job opportunities, and the ones they do find are relatively low paying ones which do not encourage individual creativity ([Visser et al. 2011](#)). This cycle is built upon unstable and untenable jobs characterized by a high turnover rate and low pay that may harm returning persons (cf. [Ramakers et al. 2017](#); [Hardisty, Sivapalan, and Brooks 2011](#)). In turn, this fuels the inability of people readjusting to community to create prosocial relations with others invested in the same career. Collectively, this contributes to increases in recidivism and promotes a higher likelihood of reincarceration.

In lieu of the status quo, carbon capture careers would benefit ex-felons while simultaneously lowering recidivism rates and benefiting an overburdened criminal justice system. [Figure 2](#) summarizes our main argument. In addition to promoting socioenvironmental justice, economic opportunities, implementing carbon capture technologies would create a system that allows an ex-felon with an alternative to the current model of employment realities in the reentry process. Built upon the sustainable platform of carbon capture in several industries, new employment opportunities would be created in the areas of manufacturing, production, transportation, and maintenance and upkeep. Created in industries which already employ ex-felons and offer steady and livable wages, these new careers would offer a stark contrast to the current realities of employment because they would provide the returning person with the ability to establish prosocial peer relationships with others who are invested in their careers. This shift in peer relationships will provide the returning person with an additional, critical factor: An extra form of support (see [Mowen, Stansfield, and Boman 2019](#) for a description of the importance of social support). In turn, this will ease the stress and difficulties of the reentry process, thereby driving down recidivism rates, easing burden on the criminal justice system, and promoting social justice.

If carbon capture technology were implemented on a wide scale in the United States, carbon capture would create new employment opportunities for returning men and women which are seated in stable industries that have a wide geographic spread across the United States. These careers would exist most noticeably in natural resource extraction, electricity generation, and the cement, steel, and iron

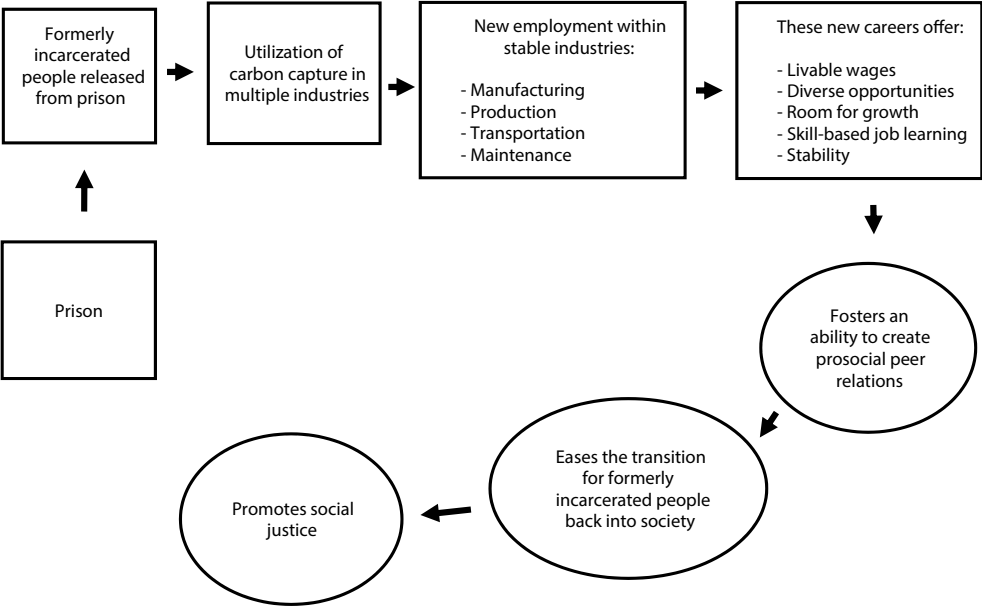


Figure 2. A structural diagram demonstrating how barriers to employment could be mitigated for those being released from prison after integrating carbon capture into the reentry process.

industries. These industries support other careers in transportation, maintenance, and machining industries. Regardless of the type of industry, these careers would offer livable wages in a diverse and stable work environment, which would provide returning men and women with room for growth and an enhanced ability to create prosocial peer relations with others who are invested in their careers. All the while, tax incentives like the 45Q tax credit would provide industries with substantial financial benefits.

In addition to the key creation of careers within varying industries spread throughout the United States, it is worth noting that the future of carbon capture technology is expanding as new methods of carbon conversion and supplemental uses are in development. For example, enhanced oil recovery – a process of a series of phases where water and a combination of chemicals are injected into oil reservoirs – could create even more jobs for returning men and women. This practice may also be beneficial for the energy production industry, as the injection process aids in the retrieval of additional, trapped oil that would otherwise be inaccessible via other recovery methods (Melzer 2012). Additionally, carbon waste may be beneficial in the fixation of carbon oxide through the growth (photo-/chemosynthesis) of algae as well as conversion and sequestration into tangible products (e.g., fertilizers, cement, polycarbonate plastics, mineralization; Folger 2018). In addition to providing even more careers to those who are undergoing reentry, this additional production would also create careers in different industries which use these primary products.

The current reality for returning persons in the United States seeking employment is characterized by numerous difficulties. These difficulties – many of which have underpinnings rooted in structural inequality – are largely driven by a lack of stable, career-type jobs which promote prosocial peer relationships. If carbon capture technology were to be implemented on a large scale in the United States, the current reality of employment during the reentry process could be completely redefined. Carbon capture technologies provide for the unique ability to robustly increase the quality and volume of careers available to people undergoing the reentry process. Due to many of these jobs being created in preexisting, stable industries which already have a wide geographical range across the country and a long history of employing the formerly incarcerated, the implementation of carbon capture technology would provide a boon of benefits to returning individuals, the criminal justice system, the American economy, and social and environmental justice. While many avenues for making meaningful changes to recidivism rates exist (see Andrews, Bonta, and Hoge 1990; Laub and Sampson 2003; Warr 2002), carbon capture technologies offer a new and potentially groundbreaking way for environmental scientists working in conjunction with sociologists and criminologists to decrease crime rates and make sweeping improvements to the quality of life for those who have been formerly incarcerated.

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References

- Andrews, D. A., James Bonta, and R. D. Hoge. 1990. "Classification for Effective Rehabilitation: Rediscovering Psychology." *Criminal Justice and Behavior* 17:19–52. doi:10.1177/0093854890017001004.
- Beaver, Kevin M., J.C. Barnes, and Brian B. Boutwell. 2015. *The Nurture versus Biosocial Debate in Criminology: On the Origins of Criminal Behavior and Criminality*. Thousand Oaks, CA: Sage Publications, Inc.
- Bickerstaff, Karen, Gordon Walker, and Harriet Bulkeley. 2013. *Energy Justice in a Changing Climate*. New York, NY: Zed Books Ltd.
- Boman, IV, H. John, and Thomas J. Mowen. 2017. "Building the Ties that Bind, Breaking the Ties that Don't." *Criminology & Public Policy* 16:753–74. doi:10.1111/1745-9133.12307.
- Burgess, Robert. L and Ronald L. Akers. 1966. "A Differential Association-Reinforcement Theory of Criminal Behavior." *Social Problems* 14 (2):128–47. doi:10.2307/798612.
- Bushway, Shawn D. 2003. *Employment Dimensions of Reentry: Understanding the Nexus between Prisoner Reentry and Work*. New York, NY: Urban Institute Reentry Roundtable. (https://www.researchgate.net/profile/Shawn_Bushway/publication/237135599_Reentry_and_Prison_Work_Programs/links/0deec52543f06d54be000000/Reentry-and-Prison-Work-Programs.pdf).
- Bushway, Shawn D. and Robert Apel. 2012. "A Signaling Perspective on Employment-Based Reentry Programming." *Criminology & Public Policy* 11:21–50. doi:10.1177/0306624X19845762.
- Climate Change. 2005. *Carbon Dioxide Capture and Storage*. Eds. Metz, Bert, Ogunlade Davidson, Heleen D. Coninck, Manuela Loos, and Leo Meyer. New York, NY: Cambridge University Press. (https://www.ipcc.ch/site/assets/uploads/2018/03/srccs_wholereport-1.pdf).
- Cox, Peter M., Richard A. Betts, Chris D. Jones, Steven A. Spall, and Ian J. Totterdell. 2000. "Acceleration of Global Warming Due to Carbon-Cycle Feedbacks in a Couple Climate Model." *Nature* 408:184–87. doi:10.1038/35047138.
- Data USA. 2019. "Iron & Steel Mills & Steel Product Manufacturing." Accessed December 5, 2019: (https://datausa.io/profile/naics/331M/#tmap_top_occs).
- Davis, Celeste, Stephen J. Bahr, and Carol Ward. 2012. "The Process of Offender Reintegration: Perceptions of What Helps Prisoners Reenter Society." *Criminology & Criminal Justice* 13:446–69. doi:10.1177/1748895812454748.
- Farrington, David P. and Darrick Jolliffe. 2017. "Special Issue on Systematic Reviews in Criminology." *Aggression and Violent Behavior* 33:1–3. doi:10.1016/j.avb.2017.01.020.
- Folger, Peter. 2018. "Carbon Capture and Sequestration (CCS) in the United States." *Congressional Research Services*. (https://aquadoc.typepad.com/files/crs_ccs_14nov2017.pdf).
- Freudenberg, Nicholas, Jessie Daniels, Martha Crum, Tiffany Perkins, and Beth E. Richie. 2005. "Coming Home from Jail: The Social and Health Consequences of Community Reentry for Women, Male, Adolescents, and Their Families and Communities." *American Journal of Public Health* 95:1725–36. doi:10.2105/AJPH.2004.056325.
- Gibbs, Carole, Meredith L. Gore, Edmund F. McGarrell, and Louie Rivers III. 2010. "Introducing Conservation Criminology: Towards Interdisciplinary Scholarship on Environmental Crimes and Risks." *British Journal of Criminology* 50 (1):124–44. doi:10.1093/bjc/azp045.
- Gottfredson, Michael R. and Travis Hirschi. 1990. *A General Theory of Crime*. Stanford, CA: Stanford University Press.
- Graffam, Joe, Alison Shinkfield, Barbara Lavelle, and Wenda McPherson. 2004. "Variables Affecting Successful Reintegration as Perceived by Offenders and Professionals." *Journal of Offender Rehabilitation* 40 (1–2):147–71. doi:10.1300/J076v40n01_08.
- Haines, Andy, Anthony J. McMichael, Kirk R. Smith, Ian Roberts, James Woodcock, Anil Markandya, Ben G. Armstrong, D. Campbell-Lendrum, A D. Dangour, M. Davies, et al. 2009. "Public Health Benefits of Strategies to Reduce Greenhouse-Gas Emissions: Overview and Implications for Policy Makers." *The Lancet* 374 (9707):2104–14. doi:10.1016/S0140-6736(09)61759-1.

- Harding, David J., J.B. Jessica, Cheyney Dobson Wyse, and Jeffrey D. Morenoff. 2011. *Making Ends Meet after Prison: How Former Prisoners Use Employment, Social Support, Public Benefits, and Crime to Meet Their Basic Material Needs*. National Poverty Center Working Paper Series. <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.359.3772&rep=rep1&type=pdf>
- Hardisty, Paul E., Mayuran Sivapalan, and Peter Brooks. 2011. "The Environmental and Economic Sustainability of Carbon Capture and Storage." *International Journal of Environmental Research and Public Health* 8:1460–77. doi:10.3390/ijerph17010244.
- IBISWorld. 2019. "Cement Manufacturing in the US Employment Statistics, 2003–2024." Accessed December 3, 2019: (<https://www.ibisworld.com/industry-statistics/employment/cement-manufacturing-united-states>).
- Schmitt, John and Kris Warner. 2011. "Ex-Offenders and the Labor Market." *WorkingUSA* 14:1–22. doi:10.1111/j.1743-4580.2011.00322.x.
- Jossi, Frank. 2018. "An FAQ on 45Q: What Federal Carbon Storage Tax Credit Means for Midwest." *Energy News Network*. Accessed on December 3, 2019: (<https://energynews.us/2018/07/10/midwest/an-faq-on-45q-what-federal-carbon-storage-tax-credit-means-for-midwest/>).
- Kirk, David S. 2012. "Residential Change as a Turning Point in the Life Course of Crime: Desistance or Temporary Cessation?" *Criminology* 50:329–58. doi:10.1111/j.1745-9125.2011.00262.x.
- Laub, John H. and Robert J. Sampson. 2003. *Shared Beginnings, Divergent Lives: Delinquent Boys to Age 70*. Cambridge, MA: Harvard University Press.
- Lyons, Thomas and Arthur J. Lurigio. 2010. "The Role of Recovery Capital in the Community Reentry of Prisoners with Substance Use Disorders." *Journal of Offender Rehabilitation* 49:445–55. doi:10.1080/10509674.2010.510769.
- Mallar, Charles D. and Craig V. D. Thornton. 1978. "Transitional Aid for Released Prisoners: Evidence from the Life Experiment." *The Journal of Human Resources* 13:208–36. doi:10.2307/145359.
- Maruna, Shadd. 2001. *Making Good: How Ex-Convicts Reform and Rebuild Their Lives*. Washington, DC: American Psychological Association.
- McBride, James. 2018. *The Risks of U.S. Steel and Aluminum Tariffs*. Council on Foreign Relations. (<https://www.cfr.org/backgrounder/risks-us-steel-and-aluminum-tariffs>).
- Melzer, Stephen L. 2012. *Carbon Dioxide Enhanced Oil Recovery (CO₂ EOR): Factors Involved in Adding Carbon Capture, Utilization and Storage (CCUS) to Enhanced Oil Recovery*. Melzer Consulting. (https://carboncapturecoalition.org/wp-content/uploads/2018/01/Melzer_CO2EOR_CCUS_Feb2012.pdf).
- Mills, Alice and Helen Codd. 2008. "Prisoners' Families and Offender Management: Mobilizing Social Capital." *Probation Journal* 55:9–24. doi:10.1177/0264550507085675.
- Mosthaf, Alexander, Claus Schnabel, and Jens Stephani. 2010. "Low-Wage Careers: Are There Dead-End Firms and Dead-End Jobs?" *Labour Market Research* 43:231–49. doi:10.1007/s12651-010-0036-4.
- Mowen, Thomas J., Richard Stansfield, and John H. Boman IV. 2019. "Family Matters: Moving beyond "If" Family Support Matters to "Why" Family Support Matters during Reentry from Prison." *Journal of Research in Crime and Delinquency* 56:483–523. doi:10.1177/0022427818820902.
- Mundaca, Luis and Jessika Luth Richter. 2015. "Assessing 'Green Energy Economy' Stimulus Packages: Evidence from the U.S. Programs Targeting Renewable Energy." *Renewable and Sustainable Energy Reviews* 42:1174–86. doi:10.1016/j.rser.2014.10.060.
- Naser, Rebecca L. and Christy A. Visser. 2006. "Family Members' Experiences with Incarceration and Reentry." *Western Criminology Review* 7:20–31. (<https://csgjusticecenter.org/nrrc/publications/family-members-experiences-with-incarceration-and-reentry-2/>).
- National Association of State Energy Officials (NASEO). 2016. "U.S. Energy and Employment Report." (https://www.naseo.org/Data/Sites/1/doe_12-9-16-naseo-useer-presentation.pdf).
- Petersilia, Joan. 2001. "When Prisoners Return to Communities: Political, Economic, and Social Consequences." *Federal Probation* 65:3–6. (
- Piquero, Alex R., David P. Farrington, and Alfred Blumstein. 2003. "The Criminal Career Paradigm." *Crime & Justice* 30:359–506. doi:10.1086/652234.
- Ramakers, Anke, Paul Nieuwbeerta, Johan Van Wilsem, and Anja Dirkzwager. 2017. "Not Just Any Job Will Do: A Study on Employment Characteristics and Recidivism Risks after Release." *International Journal of Offender Therapy and Comparative Criminology* 61:1795–818. doi:10.1177/0306624X16636141.
- Renewable Fuels Association. 2019. "Powered with Renewed Energy." (<https://ethanolrfa.org/wp-content/uploads/2019/02/RFA2019Outlook.pdf>).
- Roland-Holst, David. 2008. *Energy Efficiency, Innovation, and Job Creation in California*. Berkeley, CA: Center For Energy, Resources, and Economic Sustainability. (<https://staging.community-wealth.org/sites/clone.community-wealth.org/files/downloads/paper-roland-holst.pdf>).
- Segall, Jordan. 2011. "Mass Incarceration, Ex-Felon Discrimination, and the Black Labor Market Disadvantage." *University of Pennsylvania Journal of Law and Social Change* 14:159–82. doi:SSRN-id1674064.
- Sesha, Kethineni and David Falcone. 2007. "Employment and Ex-Offenders in the United States: Effects of Legal and Extra Legal Factors." *Probation Journal* 54:36–51. doi:10.1177/0264550507073325.

- Shannon, Sarah K. S., Christopher Uggen, Jason Schnittker, Melissa Thompson, Sara Wakefield, and Michael Massoglia. 2017. "The Growth, Scope, and Spatial Distribution of People with Felony Records in the United States, 1948-2010." *Demography* 54:1795–818. doi:10.1007/s13524-017-0611-1.
- Sutherland, Edwin H. 1947. *Principles of Criminology*. 4th ed. Philadelphia, PA: Lippincott.
- Szulcowski, Michael L., Christopher W. MacMinn, Howard J. Herzog, and Ruben Juanes. 2012. "Lifetime of Carbon Capture and Storage as a Climate-Change Mitigation Technology." *Proceedings of the National Academy of Sciences* 109:5185–89. doi:10.1073/pnas.1115347109.
- U.S. Bureau of Labor Statistics. 2019. "Mining, Quarrying, and Oil and Gas Extraction: NAICS 21." Accessed December 5, 2019: (<https://www.bls.gov/iag/tgs/iag21.htm>).
- U.S. Department of Energy. 2017. "U.S. Energy and Employment Report." Washington, D.C.: U.S. Department of Energy. (https://www.energy.gov/sites/prod/files/2017/01/f34/2017%20US%20Energy%20and%20Jobs%20Report_0.pdf).
- U.S. Energy Information Administration. 2017a. "U.S. Fuel Ethanol Production Continues to Grow in 2017." Accessed December 1, 2019: (<https://www.eia.gov/todayinenergy/detail.php?id=32152>).
- U.S. Energy Information Administration. 2017b. "Petra Nova Is One of Two Carbon Capture and Sequestration Power Plants in the World." Accessed December 1, 2019: (<https://www.eia.gov/todayinenergy/detail.php?id=33552>).
- Visher, Christy, Nancy G. La Vigne, and Jeremy Travis. 2004. *Returning Home: Understanding the Challenges of Prisoner Reentry Maryland Pilot Study: Findings from Baltimore*. Washington, DC: Urban Institute. (<http://webarchive.urban.org/publications/410974.html>).
- Visher, Christy, Sara Debus, and Jennifer Yahner. 2008. "Employment after Prison: A Longitudinal Study of Releasees in Three States." Washington, DC: Urban Institute, Justice Policy Center. (<https://www.urban.org/sites/default/files/publication/32106/411778-Employment-after-Prison-A-Longitudinal-Study-of-Releasees-in-Three-States.PDF>).
- Visher, Christy, Sara A. Debus-Sherrill, and Jennifer Yahner. 2011. "Employment After Prison: A Longitudinal Study of Former Prisoners." *Justice Quarterly* 28:698–718. doi: 10.1080/07418825.2010.535553.
- Waltermauer, Eve and Timothy A. Akers. 2013. *Epidemiological Criminology: Theory to Practice*. New York, NY: Routledge.
- Warr, Mark. 2002. *Companions in Crime: The Social Aspects of Criminal Conduct*. New York, NY: Cambridge University Press.
- Weisburd, David and Alex R. Piquero. 2008. "How Well Do Criminologists Explain Crime? Statistical Modeling in Published Studies." *Crime and Justice* 37:453–502. doi: 10.1086/524284
- Western, Bruce, Anthony A. Braga, Jaclyn Davis, and Catherine Sirois. 2015. "Stress and Hardship after Prison." *American Journal of Sociology* 120 (5):1–35. doi:10.1086/681301.
- Wilson, Elizabeth J., S. Julio Friedmann, and Melisa F. Pollak. 2007. "Research for Deployment: Incorporating Risk, Regulation, and Liability for Carbon Capture and Sequestration." *Environmental Science & Technology* 41:5945–52. doi:10.1021/es062272t.