

## **Brownfield Redevelopment and Coordinated Land Use Planning Policy in Portland, Oregon and Düsseldorf, North Rhine-Westphalia**

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Daniel Eisenbeis

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Daniel Eisenbeis  
dan.eisenbeis@gmail.com

*“No single incentive or tool is capable of leveraging redevelopment on more than a fraction of the brownfield inventory by 2035. To advance community development and economic development goals the City of Portland must work with local, regional and statewide partners to implement a broad program of incentives and tools” (Bump, 2013: 1).*

## **1. Introduction**

Redevelopment of brownfields is widely recognized in the United States and Germany as an opportunity to promote economic, community, and sustainable development, as well as public and environmental health (Umweltbundesamt, 2005; Grimski and Ferber, 2001; Tomerius, 2001; US EPA, 2014). In recent years, public sector entities in the Portland, Oregon metropolitan region have undertaken a renewed focus on redevelopment of brownfield sites. Seeking to build upon well-developed state and local government programs, several studies have been conducted to assess the brownfields situation and develop policy proposals for brownfield redevelopment, particularly based on model policies from other US states and cities (City of Portland BPS, 2012b; Homolac, 2011; Metro, 2012; Port of Portland et al., 2004; PDC, 2010).

This paper compares brownfield and urban planning policies and strategies in Portland and Oregon with those in Düsseldorf and Germany, and seeks to enrich the policy discussion in each place based on those findings. To conduct the research, I reviewed relevant planning and policy documents and scholarly literature from Oregon and Germany, as well as interviewed policymakers and practitioners in Germany. I conducted approximately two dozen semi-structured interviews during 2014 and 2015, asking questions about brownfield remediation and redevelopment and urban planning instruments, institutional structures, policies, goals, and strategies in Düsseldorf, North Rhine-Westphalia, and elsewhere in Germany (see Appendix). I supplemented this research with information from experts in Oregon.

First, this paper provides portraits of Portland and Düsseldorf. It then reviews the applicable terminology and brownfield situation in the two cases studies and discusses the respective land use planning policy frameworks and use of associated targets to measure and drive outcomes. The paper then discusses the contaminated site regulatory frameworks and compares and contrasts the approaches to investigation and availability of data on potentially contaminated sites, the process for site assessment, and public sources of funding. The paper concludes with a discussion of the findings, limitations, and areas for future research.

## **2. The Case Studies**

### **2.1 Germany and Oregon**

The United States and Germany share key governance and economic similarities pertinent to urban planning and policy matters (Hirt, 2007, 2010; Schmidt and Buehler, 2007). Both are liberal democracies with federal governance systems that experienced similar patterns of economic restructuring and levels of gross domestic product per capita growth in recent decades (Leonard, 1983; Hirt, 2007, 2010; Schmidt and Buehler, 2007). Legal responsibility for site contamination is similar in Germany and the US/Oregon. Federal agencies from the two countries have also conducted a multiphase bilateral working group to share information about brownfield redevelopment technologies, approaches and policies, including case study projects from Portland (US EPA and BMBF, 2006, 2012).

The land use regulation and planning regimes in the US and Germany are quite different, however. The US approach is typically characterized by localization and fragmentation, with comparatively weak overt involvement of the federal and most state governments, corresponding delegation of land use authority to municipalities, reliance on zoning (especially to separate land uses), and weak links between zoning and comprehensive planning (Light, 1999). However, the land use planning

framework in the state of Oregon is an outlier in the US and resembles German policies, encouraging development of urban areas and restricting development of rural lands (Leonard, 1983; Light, 1999). Germany and Oregon both require coordinated plan development and implementation by lower levels of government to address specified qualitative planning goals. Regional planning bodies also play a significant role in both Portland and Düsseldorf. Together, these factors provide a basis for comparing the policy frameworks for contaminated site remediation and brownfield redevelopment in two cities.

## 2.2 Portrait of Portland

Portland is the largest city in the state of Oregon, on the West Coast of the United States of America. It is situated at the northern end of the fertile Willamette Valley and at the confluence of two major rivers: the Willamette and the Columbia, which forms the border between the states of Oregon and Washington and flows to the Pacific Ocean. As of 2012, the city of Portland had a population of 587,865 and the functional urban area spanning seven counties in Oregon and Washington had a population of 2.3 million, while approximately 4 million people live in Oregon as a whole (OECD, n.d.-a; PSU Population Research Center, 2015).<sup>1</sup> Of the 2.3 million people living in the functional urban area, approximately 1.5 million people live within the ‘urban growth boundary’ designated by Metro in the Oregon portion of the region (Christensen, 2015). Between 2000 and 2011, the city of Portland population grew by an average of 0.925% per year and the Portland urban functional area population grew an average of 1.45% annually (OECD, n.d.-a; PSU Population Research Center, 2015).

Portland has experienced strong sociodemographic reurbanization trends. Between 1980 and 2010, the share of central city Portland residents living in census tracts ranked in the top-third for income in the metropolitan area more than doubled (Baum-Snow and Hartley, 2015). Whereas a vast majority of American cities between 1990 and 2012 experienced a shift of the lowest income groups from central cities to first ring suburbs, Portland is one of a handful of cities in which incomes and education rates are highest in the central city and gradually decline toward the urban periphery (Juday, 2015). The Portland city core also increased its share of metropolitan region employment between 2002 and 2011 (Cortright, 2015; Hartley et al., 2015).

Cities and counties adopt comprehensive plans to meet Statewide Planning Goals in Oregon, which was one of the first states in the US to adopt a statewide land use planning framework. In the Oregon portion of the Portland metropolitan region, voters in 1978 created a directly elected regional government, Metro, that also has planning competency (Abbott and Abbott, 1991). Portland was recognized for its brownfield redevelopment efforts by being selected in 1998 by a partnership of fifteen federal agencies as a Brownfields Showcase Community (US EPA, 1998)

## 2.3 Portrait of Düsseldorf

The city of Düsseldorf is located in western Germany along the Rhine River, a major navigable waterway. It is the capital and second largest city in North Rhine-Westphalia, the most populous of the sixteen German federal states and home to one-fifth of all Germans (City of Düsseldorf and Partners, n.d.). The city is several hundred years old and has a 160-year industrial history (Landeshauptstadt Düsseldorf Stadtplanungsamt, 2013a). Part of the polycentric Rhine-Ruhr urban region, Düsseldorf has in the past been referred to as the “Schreibtisch des Ruhrgebiets” or “desk for the Ruhr region” in reference to the white collar services it historically provided to the nearby traditional industrial heart of Germany.

Unlike most cities in North Rhine-Westphalia, Düsseldorf has experienced a consistent recent trend of population growth, mostly due to migration. Between 2000 and 2012, the population of the city increased each year at an average annual rate of 0.356% from 569,364 to 593,682 (German Federal Statistical Office, 2015). However, population in the Düsseldorf functional urban area has been

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<sup>1</sup> A functional urban area is an urban core area, or interconnected urban core areas, and the associated worker catchment area in the hinterland; Brezzi et al. discuss specific methodology in detail (2012).

essentially flat, declining an average of 0.017% annually from 2000 to 2012 and hovering near 1.43 million people (OECD, n.d.-a). Düsseldorf is within 500 km (310 miles) of 31 percent of the population of the European Union and half of its purchasing power (City of Düsseldorf, 2011).

The population growth in Düsseldorf reflects significant economic expansion in recent years. Between 1996 and 2010, the gross domestic product of Düsseldorf grew by 36%, significantly higher than Germany (32.8%) or North Rhine-Westphalia (29.1%) (City of Düsseldorf and Partners, n.d.). Düsseldorf is a wealthy city, with the second highest purchasing power index of all German cities (City of Düsseldorf and Partners, n.d.). The City of Düsseldorf also touts its debt-free financial situation as ensuring its ability to make future infrastructure investments (City of Düsseldorf, 2011).

The German federal government establishes planning and development policy, including identification of goals that must be weighed by land use plans. German cities, counties and federal states formulate land use plans, which must also be coordinated between different levels of government. Düsseldorf conducts city planning within the context of regional planning conducted by the Bezirksregierung Düsseldorf (Düsseldorf District Government), a regional body of the North Rhine-Westphalia state government. Politically, Düsseldorf is considered a special case in Germany for being particularly committed to limiting greenfield development. The city has made compact city and urban redevelopment the central tenet of its planning strategy (Landeshauptstadt Düsseldorf Stadtplanungsamt, 2009).

**2.4 Comparing Portland and Düsseldorf**

Portland and Düsseldorf are both inland port cities with similarly-sized and growing populations of around 600,000 residents within the city. The respective metropolitan area economies both include a mix of manufacturing and service industries (European Cluster Observatory, 2011, 2014; Mayer and Provo, 2004; NRW.INVEST, n.d.). The two cities are also comparable based on indicators of innovation and capacity for knowledge development (Martinus, 2012).

	<b>Portland</b>	<b>Düsseldorf</b>
2012 city population <sup>2</sup>	587,865	593,682
2012 urban functional area population <sup>3</sup>	2,291,426	1,427,941
2010 city population density (people/square kilometer) <sup>4</sup>	1,689	2,710
2000-2012 city population average annual growth rate <sup>5</sup>	0.925%	0.356%
2000-2012 urban functional area population average annual growth rate <sup>6</sup>	1.45%	-0.017%
Key economic sectors <sup>7</sup>	metals/machinery/transportation equipment; creative services agriculture /forestry; high technology; wood/paper products; nursery stock	metals manufacturing; communications/media; biopharmaceuticals;

However, population density in the city of Düsseldorf is 60 percent higher than in the city of Portland (German Federal Statistical Office, 2015; US Census Bureau, 2010). Also, from 2000-2012 the population of Portland grew more than twice as fast as that of Düsseldorf (German Federal Statistical Office, 2015; PSU Population Research Center, 2015). Whereas the population of the Portland

<sup>2</sup> German Federal Statistical Office, 2015; PSU Population Research Center, 2015  
<sup>3</sup> OECD, n.d.-a  
<sup>4</sup> Own calculations using data from German Federal Statistical Office, 2015; US Census Bureau, 2010  
<sup>5</sup> Own calculations using data from German Federal Statistical Office, 2015; PSU Population Research Center, 2015;  
<sup>6</sup> OECD, n.d.-a  
<sup>7</sup> European Cluster Observatory, 2011, 2014; Mayer and Provo, 2004; NRW.INVEST, n.d.

functional urban area grew faster than the city of Portland, population in the Düsseldorf functional urban area actually declined slightly (German Federal Statistical Office, 2015; OECD, n.d.-a; PSU Population Research Center, 2015). Düsseldorf is the second largest city in one of the most densely populated states of Germany and is near several other medium to large cities, whereas Portland is a monocentric metropolitan region in a vast state with a relatively small population. Approximately 18 million people live in North Rhine-Westphalia compared to four million people in Oregon (OECD, n.d.-b). Meanwhile, the surface area of Oregon is more than seven times larger than North Rhine-Westphalia and more than two-thirds the size of all of Germany (OECD, n.d.-b).

Portland and Düsseldorf both employ growth management strategies that emphasize urban vitality and protection of rural landscapes. Planning in both cities is conducted within a coordinated regional framework based upon formal state (in the case of Oregon) and federal (in the case of Germany) policy goals. The two cities are also each in the process of updating their respective city development concepts (City of Portland BPS, 2015e; Landeshauptstadt Düsseldorf Stadtplanungsamt, 2013a).

### **3. Brownfields in the Case Studies**

#### **3.1 Definitions of Brownfields**

The concept of brownfields differs in the US (including Oregon) and Germany. In the US, federal law defines “brownfield” as “real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.” The federal statutory definition also includes an exception for severely contaminated sites that have been designated on the National Priorities List or “Superfund Site” list by the US Environmental Protection Agency (EPA) (107<sup>th</sup> Congress, 2002).

Oregon statute similarly defines “brownfield” as “real property where expansion or redevelopment is complicated by actual or perceived environmental contamination” (Or. Rev. Stat. § 285A.185(1), 2013). The statutory definition applies specifically to Oregon Business Development Department brownfield financing programs, though the Oregon Department of Environmental Quality also agrees with it (Oregon DEQ, 2010; Wistar, personal communication, May 29, 2015).

Germany does not have a legal definition of “brownfield,” but the term is commonly translated to “*Brachfläche*,” which means a derelict or vacant urban site, but does not necessarily entail perceived or actual contamination (Grimski and Dosch, 2010; Oliver et al., 2005; Pahl-Weber and Henckel, 2008). German law does define “*Altlasten*,” which describes former waste disposal sites (*Altablagerungen*) and disused industrial sites (*Altstandorte*) with contaminated soils that pose a threat to human health or the environment, especially groundwater (Bundes-Bodenschutzgesetz § 2, 2012; Pahl-Weber and Henckel, 2008; Reh binder, 2004).

Whereas the US, New Zealand, and countries with low population densities closely associate brownfields with land contamination, Western European countries with high population densities and high levels of competitiveness tend to define brownfields as previously developed land, suggesting such a definition is the result of the need to make more land available in urban areas (Oliver et al., 2005; Tang and Nathanail, 2012). The broader definition of “brownfield” as all “previously developed land” has resulted in countries such as England and Germany integrating brownfield sites into strategic planning policy goals to create sustainable cities (Ganser and Williams, 2007).

#### **3.2 Extent of Brownfields**

Estimates of the extent of brownfields vary depending on definition and methodology. The Oregon Business Development Department estimates there are 13,000-13,500 brownfield sites statewide, only 35% of which have been assessed or worked on (Business Oregon, 2015; Oregon Brownfields Coalition, 2015). The City of Portland estimates 1,055 sites totaling 368 hectares (910 acres) of potential brownfields for which possible contamination has been reported in commercial and industrial areas, 94 hectares (233 acres) of which also have potential federal environmental liability for river

sediment contamination in the federally-designated Portland Harbor Superfund site (City of Portland BPS, 2012b). The City has also identified an additional 153 hectares (378 acres) of potential brownfields on 531 sites based on analysis of historical business directories (City of Portland BPS, 2012a).

In Germany, the infill development potential of *Brachflächen* and gap sites totals an estimated 165,000 hectares, accounting for between 5% and 7% of the land in German municipalities (Schiller et al., 2013). Germany has an estimated 315,000 sites suspected to be contaminated (including 220,000 disused industrial sites and 95,000 former waste disposal sites), 15,000 contaminated sites, and 25,000 remediated sites (Bieber, 2014). Düsseldorf has identified 5,894 disused industrial sites and 497 former waste disposal sites (Derenthal, personal communication, September 7, 2015). The high number of old waste deposits is partially explained because sand and gravel were dredged for construction materials, and later the holes were filled with waste, particularly after World War II (Derenthal, interview, December 10, 2014).

#### **4. Planning Policy Frameworks**

##### **4.1 Land Use Planning Policy Framework in Germany and Oregon**

Land use planning policy at the state (Oregon) and federal (Germany) levels, respectively, establishes the framework for local planning in Portland and Düsseldorf. Oregon and German statutes both prescribe land use policy, including qualitative goals, that must be addressed by land use plans developed and implemented by lower levels of government. Both systems have also long made legal distinctions between urban and rural lands, and have sought to focus development within designated urban areas. Moreover, both planning regimes emphasize coordination of planning between government bodies.

Oregon enacted its current statewide land use planning system in 1973.<sup>8</sup> Cities and counties are required to adopt and periodically update comprehensive land use plans that meet 19 Statewide Planning Goals established by the Oregon Land Conservation and Development Commission. In the Portland metropolitan area, a regional government, Metro, also adopts regional plans. Local government and state and federal agency plans and actions related to land use of must be consistent with city and county comprehensive plans and Metro regional plans (Oregon DLCD, 2010). Local comprehensive plans are reviewed for concurrency with the Statewide Planning Goals by the Oregon Department of Land Conservation and Development. This combination of state requirements and authority with local action has been characterized as a combination of ‘top-down’ and ‘bottom-up’ planning (Seltzer, 2008). Examples of the Statewide Planning Goals are: citizen involvement, agricultural land, forest land, housing, urbanization, transportation, energy conservation and economic development (Oregon DLCD, 2010).

Oregon Goal 14 (Urbanization) requires cities and counties to establish and maintain urban growth boundaries (UGBs), except in the Portland metropolitan area, where Metro adopts and manages a coordinated regional UGB on behalf of 24 cities and portions of three counties. Urban development is not permitted outside of UGBs. Establishment and amendment of UGBs must be based on a 20-year population forecast and provide for needed housing, employment, and other urban uses consistent with the population forecast. If a local government finds that developable land within a UGB is not sufficient to meet 20-year needs, it must amend its comprehensive plan to increase development capacity within the UGB or expand the UGB (Oregon DLCD, 2010). Before expanding a UGB, “a local government must demonstrate that the estimated needs cannot reasonably be accommodated on land already inside the UGB” (Or. Admin. R. 660-024-0050(4), 2009). The requirement for a 20-year developable supply of land means that UGBs in Oregon do not necessarily pose a binding constraint on development or affect overall growth of property values (Jaeger and Plantinga, 2007).

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<sup>8</sup> State law enacted in 1969 required cities to adopt comprehensive plans, but lacked the plan coordination and state oversight role that became hallmarks of the planning system in Oregon (Leonard, 1983).

Regulations implementing Oregon Goal 9 (Economic Development) directly address brownfields as a potential source of developable land for industrial use, stating that “cities and counties are strongly encouraged to adopt plan policies that include brownfield redevelopment strategies for retaining land in industrial use and for qualifying them as part of the local short-term supply of land” (Or. Admin. R. 660-009-0020(5), 2007). The guidelines for Goal 13 (Energy Conservation) also state “land use planning should, to the maximum extent possible, seek to recycle and re-use vacant land and those uses which are not energy efficient” (Oregon DLCD, 2010).

In Germany, the national planning and urban development policy framework is set by the federal *Baugesetzbuch* (Federal Building Code) and *Raumordnungsgesetz* (Federal Spatial Planning Law), with plan development and implementation at the *Länder* (state), regional, *Kreise* (county), and city levels. Authorities provide input and mutually influence proposals at the other levels of planning through the *Gegenstromprinzip* or ‘counter-current principle’ (Kunzmann, 2010; Pahl-Weber and Henckel, 2008; Schmidt and Buehler, 2007). Municipalities adopt an urban land use plan that consists of a preparatory land use plan covering the entire city and binding land use plans, which are based on the preparatory land use plan and specify permitted development and building conditions for a site or local area. Urban land use plans must weigh various public and private interests specified in the Federal Building Code, including public health and safety, housing, social and cultural needs, historic resources, environmental protection, economic interests, and public services (Baugesetzbuch § 1(6), 2014; BBR, 2000).

A longstanding planning concept in Germany is the distinction between *Innenbereich*, those built up and interconnected “inner areas” of municipalities, and *Außenbereich*, the rural “outer areas” outside of towns and cities; this is the basis for the corollary principle of “inner development before outer development” (Grimski, interview, July 13, 2015; BBR, 2000; Leonard, 1983; Pahl-Weber and Henckel, 2008). The Federal Building Code specifies that urban development take place primarily through inner area development in order to ensure sustainable urban development (Baugesetzbuch § 1(5), 2014). It goes on to state that land and soil should be used sparingly, specifying that reutilization of land, densification and other measures for inner area development are to be used to reduce the additional consumption of outer areas for construction and to limit the sealing of soil to the amount necessary (Baugesetzbuch § 1a(2), 2014). The necessity of converting agricultural or forest land should be justified, based on the possibilities of inner area development, including brownfields, building vacancy, vacant lots and other densification possibilities (Baugesetzbuch § 1a(2), 2014). Similarly, the Federal Spatial Planning Law sets forth that the initial utilization of open space for settlement and transport is to be reduced, in particular through the full development of the potential for land rehabilitation, densification and any other measures for inner development of cities and towns, and the development of existing traffic areas (Raumordnungsgesetz § 2(6), 2009). The Federal Building Code also allows for the expedited approval of urban redevelopment and densification projects (Baugesetzbuch § 13, 2014).

Municipalities have considerable planning authority under German law in how to balance meeting various formal planning goals, however, meaning these federal provisions are not sufficient on their own to achieve Germany’s formal goals for reducing greenfield land consumption (Grimski, interview, July 13, 2015; Thomas, 2011). Competition exists between German municipalities to attract new residents and businesses in order to gain a higher share of federally distributed tax revenue and increased local commercial/industry tax revenues, thus leading to a practice of municipalities creating land reserves in anticipation of the construction and tax revenues they expect or hope to receive (Thomas, 2011).

#### **4.2 Regional Planning Policy Framework in Düsseldorf and Portland**

The urban growth management concept in the Portland metropolitan region is established by the *2040 Urban Growth Concept*, adopted in 1995, which calls for a hierarchy of pedestrian-friendly mixed use centers well-connected by high capacity transit, a multimodal transportation system, and a clear distinction between urban and rural lands (Metro, 2011b). This concept and other regional policies including the *Regional Transportation Plan*, *Regional Urban Growth Goals and Objectives*, and



*Metropolitan Greenspaces Master Plan* are integrated into the *Regional Framework Plan*, most recently amended in 2014 (Metro, n.d., 2011a). The *Regional Framework Plan* must comply with statewide planning goals and guides management of the regional urban growth boundary, regional transportation and transit systems, urban design, housing densities, natural resource lands, and water resources (Metro, n.d., 2011a).

*Regional Framework Plan* policies call for encouraging the redevelopment of land previously developed for commercial or industrial purposes wherever economically and environmentally feasible and including the potential for redevelopment and infill when calculating the supply of buildable land within the urban growth boundary (Metro, 2015a). The *Urban Growth Management Functional Plan* implements the policies of the *2040 Growth Concept* and *Regional Framework Plan* as binding requirements for city and county comprehensive plans (Metro, 2014c).

Under Oregon law, Metro must adopt and periodically review the Portland metropolitan region urban growth boundary and supply of developable land. The urban growth boundary has been revised more than thirty times since being established in 1979, but only seven of those times was the expansion more than 1,000 acres (405 hectares) (Metro, 2014a). By far the largest UGB expansion was by 17,756 acres (7,186 hectares) in 2002 (Metro, 2014a). From 1998 to 2012, however, 94 percent of all 111,500 new residential units were built within the original 1979 urban growth boundary rather than later expansion areas (Metro, 2014b). Development in most urban expansion areas has been hampered by challenges of governance, annexation, infrastructure funding, service provision, planning, and land assembly (Metro, 2014b).

This year, Metro's Chief Operating Officer recommended that the elected Metro Council not expand the regional urban growth boundary for the current review cycle (Metro, 2015b). Metro currently calculates regional surpluses of 6,200-11,900 single-family dwelling units and 9,600-29,100 multifamily dwelling units in the 2015-2035 twenty year period based on existing plans and policies (Metro 2014b, 2014d). Depending on the strength of employment growth that is forecast, for the same twenty year period Metro calculates the industrial land supply to range from a 1,300 acre (526 hectare) deficit to a 4,800 acre (1,942 hectare) surplus and the commercial land supply to be between a 700 acre (283 hectare) deficit and 2,700 acre (1,093 hectare) surplus (Metro 2014b, 2014d).

In North Rhine-Westphalia, the state government has given planning competence to district (regional) governments, including the *Bezirksregierung Düsseldorf* (Düsseldorf District Government). The *Bezirksregierung Düsseldorf* adopted its current *Gebietsentwicklungsplan* (Area Development Plan) in 2000 (*Bezirksregierung Düsseldorf*, 2011). A portion of the district government territory was transferred in 2009 to the *Regionalverband Ruhr* (Ruhr Regional Association), which also was granted planning competency. The *Bezirksregierung Düsseldorf* is currently developing a new regional plan, which it aims to finalize in 2016 (*Bezirksregierung Düsseldorf*, 2014; van Gemmeren, interview, December 15, 2014). Similar to the Portland region, the draft *Regionalplan Düsseldorf* is based on 20 year population projections (van Gemmeren, interview, December 15, 2014). Developable land supplies are assessed within the region assuming that sites will develop at densities equivalent to the average density of municipalities in each centrality of place grouping; only half of brownfields (*Brachflächen*) are counted because of the difficulty of redevelopment (van Gemmeren, interview, December 15, 2014). The region assumes that 25% of land needs in each community will come from future redevelopment of currently built and occupied sites; however, the assumption for the city of Düsseldorf is that 60% of land needs will come from already developed sites (van Gemmeren, interview, December 15, 2014). Düsseldorf is projected to need space for approximately 30,000 housing units over the next 20 years, but only has space for 17,000-18,000; the excess allocation will be apportioned to a ranked list of regional sites (van Gemmeren, interview, December 15, 2014).

#### **4.3 Urban Planning Policy Framework in Düsseldorf and Portland**

Both the cities of Düsseldorf and Portland have recently been in the process of updating their respective city development concepts, the *Stadtentwicklungskonzept* (city development concept) and

the Comprehensive Plan, respectively (City of Portland BPS, 2015e; Landeshauptstadt Düsseldorf Stadtplanungsamt, 2013a).

The City of Düsseldorf declares its urban development model as “Innen- vor Außenentwicklung” or “inner before outer development” (Landeshauptstadt Düsseldorf Stadtplanungsamt, 2009). The City’s adopted *Stadtentwicklungskonzept 2020+* from 2009 and draft *Stadtentwicklungskonzept 2025+* update underscore a commitment to developing inner areas and protecting the outskirts, despite competing land claims and increasingly scarce land reserves that come with significant population and employment growth (Landeshauptstadt Düsseldorf Stadtplanungsamt, 2009, 2013a).

Düsseldorf has a stated goal of optimizing the utilization of available land for high density in the inner region in order to protect the open spaces in the outskirts (Landeshauptstadt Düsseldorf Stadtplanungsamt, 2009, 2013a). The central city contains the highest density districts in Düsseldorf and density decreases continuously as the distance from the inner city increases (Landeshauptstadt Düsseldorf Stadtplanungsamt, 2009). In its *Stadtentwicklungskonzept 2020+*, Düsseldorf identified 431 hectares of restructuring areas for redevelopment, essentially areas transitioning from industrial to other uses (Landeshauptstadt Düsseldorf Stadtplanungsamt, 2009).

The City of Portland *Comprehensive Plan* update for the 2035 planning horizon will guide long term land use, development, and public facility investments. The *Draft Recommended Plan* calls for efficient use of land, including investments and incentives to promote infill, redevelopment and intensification of urban land (Policy 3.6) (City of Portland BPS, 2015a). It also proposes several brownfield policies, with an emphasis on economic development. Portland’s emphasis on brownfield redevelopment, particularly for industrial reuse, is driven by two factors: first, the city is generally landlocked, bounded by other municipalities or natural boundaries, and second, City can only provide enough developable land to provide for 20 years of employment needs if substantial brownfield land is redeveloped for industrial use (Bump, 2013; City of Portland, 2012).

The *Draft Recommended Plan* proposes overcoming financial feasibility gaps to clean up and redevelop 60% of the brownfield sites in the city by 2035 to support Portland’s land supply for job growth (Policy 6.14) (City of Portland BPS, 2015b). Multiple policies address industrial and employment districts: using brownfield remediation to help offset any reduction in development capacity of prime industrial lands (Policy 6.39.d.), making sure the transportation system supports full utilization of prime industrial land, including brownfield redevelopment (Policy 9.30), taking a leadership role in the Portland Harbor Superfund Site cleanup process and redevelopment of associated brownfields (Policy 6.41), and providing incentives, technical assistance, investments, and other direct support to support cleanup and redevelopment of brownfields for industrial use (Policy 6.46) (City of Portland BPS, 2015b, 2015d). The *Draft Recommended Plan* also calls for improving environmental quality and watershed health through cleanup and redevelopment of brownfields using ecological site design and resource enhancement (Policy 7.17) (City of Portland BPS, 2015c).

The policies in the *Draft Recommended Plan* are consistent with similar provisions in *The Portland Plan*, the City’s strategic plan adopted in 2012 (Portland City Council, 2012). *The Portland Plan* calls for taking a leadership role in the Portland Harbor Superfund effort, developing a brownfield redevelopment strategy, pursuing legislation and funding options to accelerate cleanup of brownfields, and continuing pollution prevention efforts to prevent creation of future brownfields (City of Portland, 2012).

#### **4.4 Use of Targets to Measure Outcomes and Drive Future Action**

A key provision of Germany’s brownfield redevelopment framework is the adoption of quantitative milestones for reducing consumption of greenfield sites. By the late 1990s, then German Environment Minister Angela Merkel proposed creation of an *Umwelt-Barometer Deutschland* (Germany Environmental Barometer) to benchmark progress toward meeting environmental goals, including reduction of land consumption for settlement and transportation purposes (BMUB, 1998). In 2002, the German federal government adopted a sustainability strategy, *Perspektiven für Deutschland*

(Perspectives for Germany), that established a goal to reduce consumption of greenfield land for settlement and transportation uses from 129 hectares per day in 2000 to 30 hectares per day by 2020 (Bundesregierung, 2002).

Observers noted that the 30 hectare per day goal would need to be adapted to the various levels of planning in Germany in order to have any meaning at the regional or local level (Ganser and Williams, 2007). In 2009, the national goal was translated into recommended state level targets, including development of no more than 5.7 hectares per day of greenfields by 2020 in North Rhine-Westphalia (Fritsch, interview, July 15, 2015; Kommission Bodenschutz des Umweltbundesamtes, 2009). The governing coalition of North Rhine-Westphalia has adopted a 2020 goal of limiting greenfield consumption to 5 hectares per day (NRWSPD – Bündnis 90/Die Grünen NRW, 2012). The 5 hectare per day goal is in turn embedded in the draft update to the North Rhine-Westphalia state land use plan, as well as its European Regional Development Fund operational plan for 2014-2020 (MWEIMH, 2014; Staatskanzlei des Landes Nordrhein-Westfalen, n.d.-a, n.d.-b, 2013).

The City of Düsseldorf has reduced the growth in settlement and transport areas from 160 hectares per year in the 1980s to 22 hectares per year (Landeshauptstadt Düsseldorf Stadtplanungsamt, 2013a). In assessing its progress, the City of Düsseldorf notes that extrapolation of the federal 30 hectare per day target would translate to development of a maximum of 80 hectares per year of greenfield sites in Düsseldorf (Landeshauptstadt Düsseldorf Stadtplanungsamt, 2013a).

The establishment of the formal 30 hectares per day goal has become an important impetus and reference point for development and implementation of additional specific policies and initiatives launched by the federal government, *Länder*, and cities (Grimski and Dosch, 2010; Schiller et al., 2013). Since the federal land consumption reduction targets were adopted, Germany has acted to modify or eliminate certain public policies that incentivized sprawl, including narrowing a tax subsidy for commuting costs, modifying the owner-occupied home tax break, and abolishing a subsidy for building homes (Thomas, 2011; Thornton et al., 2007). Amendments to the Federal Building Code and Federal Spatial Planning Law to promote urban redevelopment were approved in 2006 and 2008 (Schulze Baing, 2010; Gesetz zur Erleichterung von Planungsvorhaben, 2006; Gesetz zur Neufassung des Raumordnungsgesetzes, 2008; Grimski and Dosch, 2010).

The German federal government also funded a specific research program, REFINA (Research for the Reduction of Land Consumption and for Sustainable Land Management), to develop and test concepts for the reduction of land consumption to support meeting the 30 hectare per day target (DIFU, 2008). The Umweltbundesamt (Federal Environment Agency) is currently conducting research to assess the viability of a development credit trading system to achieve Germany's 30 hectare per day by 2020 goal. In such a system, municipalities would be allocated a limited number of development credits, which in turn would be required for a municipality to allow development on a specified amount of (greenfield) land in outer areas (*Außenbereich*) (Fritsch, interview, July 15, 2015; Grimski, interview, July 13, 2015). The current pilot project assumes credits would be allocated to municipalities using a population based formula (Grimski, interview, July 13, 2015). Municipalities would then be able to buy or sell those credits based on their respective urban development decisions (Fritsch, interview, July 15, 2015; Grimski, interview, July 13, 2015). Though the outcome of the research is not yet determined, it again demonstrates the effect of commitment to the 30 hectare per day goal to drive policy innovation.

At the time the German 30 hectare per day goal was adopted, an even more ambitious goal of reducing greenfield consumption to zero by 2050 had been also discussed (Bundesregierung, 2002). A decade later, the European Commission included the aim of achieving no net land take by 2050 as part of its Roadmap to a Resource Efficient Europe (2011). The City of Düsseldorf and North Rhine-Westphalia have also stated the long term goal of sustainable soil management of net zero of land consumption (Landeshauptstadt Düsseldorf Stadtplanungsamt, 2013a; NRWSPD – Bündnis 90/Die Grünen NRW, 2012).

Germany's experience suggests that political and public buy-in is a critical factor for the impact of the goal. The 30-hectare-per-day target was established as part of broader strategy on sustainability for the federal government and was championed by a minister, Angela Merkel, who went on to eventually become Chancellor of the Federal Republic. The Federal Government has regularly published public progress reports on implementation of the sustainability strategy, and support for the strategy has been reiterated as governing coalitions have changed over time.

Oregon does not have a target for the amount of brownfield redevelopment or for limiting greenfield development as in Germany. The State does employ benchmarks for retention of farm and forest zoned land consistent with Statewide Planning Goal 3 (Agricultural Lands) and Goal 4 (Forest Lands). The Oregon Department of Land Conservation and Development reports to the Oregon Legislative Assembly every two years on how well the state is meeting targets for retaining land zoned for farm use and land zoned for forest use. As of 2013, the two 'key performance measures' respectively called for 99.88% of the farm land zoned for farm use in 1987 to remain zoned for farm use and for 99.95% of forest land zoned for forest use in 1987 to remain in forest or mixed farm/forest zones (Oregon DLCDC, 2014a, 2014b). DLCDC in turn reported that 99.86% of farm land zoning had been retained and 99.92% of forest land zoning had been retained (Oregon DLCDC, 2014a).

DLCDC notes two drawbacks to the farm and forest zone retention benchmarks. First, the amount of land rezoned is so small compared to the large base of farm and forest zoned land in Oregon that it does not register on the graphs provided to the Legislature (Oregon DLCDC, 2014b). Second, conversion of farm land or forest land to other uses without a zone change is not measured, even though several times as much land is estimated to be converted in this manner than converted when involving a zone change (Oregon DLCDC, 2014b). As such, DLCDC suggests consideration of also measuring actual land conversion to supplement the existing key performance measures (Oregon DLCDC, 2014b).

Germany's 30 hectare per day goal is potentially instructive for Oregon in that it measures the rate of land conversion and produces results that register on a graph of trends over time. However, Germany's 30 hectare per day goal and Oregon's farm and forest land retention goals also point to differences in policy priorities. Amongst Oregon's other key performance measures are the percent of land added to UGBs that is not farm or forest land, the percent of cities with an adequate supply of land for employment needs, and the percent of cities with an adequate supply of land for housing needs (Oregon DLCDC, 2014a, 2014b). Germany's goal directly supports limiting urban growth and indirectly supports brownfield redevelopment, but it does not distinguish amongst the prior uses of greenfield sites (e.g. agricultural use, forest use, natural areas) that are converted. Critics contend that German spatial planning tends to view rural areas merely as remaining space outside of urban conurbations and agglomerations (Thomas, 2011).<sup>9</sup>

## **5. Contaminated Site Policy Framework and Governance**

### **5.1 Contaminated Site Liability and Governance**

The legal framework for site contamination liability is similar in Portland and Düsseldorf. The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) in the US, Oregon environmental cleanup law, and the *Bundes-Bodenschutzgesetz* (Federal Soil Protection Act) in Germany each impose strict, joint and several liability for contaminated properties (CABERNET, 2003; Environmental Law Institute, 2002; Hermann et al., 2003; OECD, 2003; Or. Rev. Stat. §§ 465.255-.257, 2013; Reh binder, 2004). Oregon and Germany both use hazard-based risk assessment to determine the necessity and extent of remediation actions (*Bundes-Bodenschutzgesetz* §2, §9, 2012; Or. Rev. Stat. § 465.315, 2013). However, significant differences exist in which levels of government are responsible for implementing cleanup regulations.

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<sup>9</sup> The City of Düsseldorf *Stadtentwicklungskonzept 2025+* draft, however, discusses the predominance of agricultural areas outside the city, as well as the location and function of soils in the urban area that are particularly worthy of protection (Landeshauptstadt Düsseldorf Stadtplanungsamt, 2013a).

In the US, the liability scheme for site contamination traces to the 1980 *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) or ‘Superfund’ law, which was approved by the US Congress in the wake of the high profile Love Canal pollution case. Under the law, the worst contaminated sites are designated on the National Priorities List or ‘Superfund’ list.

CERCLA provides for strict, joint and several liability for properties contaminated by hazardous materials (Hermann et al., 2003; OECD, 2003). However, the strict liability and regulatory approach of CERCLA had a significant chilling effect on property transactions and development involving sites known or suspected to be contaminated (Tomerius, 2001; Wernstedt et al., 2010). CERCLA was amended in 1986 to add a legal defense for innocent purchasers of property (Burns and Nelson, 2007). The 2002 *Small Business Liability Relief and Brownfield Revitalization Act* amendments exempted certain contiguous landowners and certain prospective purchasers from liability, and required that Superfund listing be deferred if a party is cleaning up a site under a state program or if a state is pursuing a cleanup agreement (Burns and Nelson, 2007; US EPA 2011a, 2011b). The law also codified the definition of brownfield, including an exception for Superfund sites designated by the US EPA (107<sup>th</sup> Congress, 2002).

The Oregon Department of Environmental Quality (DEQ), rather than the US EPA, is typically involved in the cleanup of brownfield sites in Oregon (US EPA, 2014; Wistar, personal communication, May 29, 2015). The environmental cleanup statute in Oregon is patterned on the national statute and also imposes strict, joint and several liability (Environmental Law Institute, 2002; Hermann et al., 2003; Or. Rev. Stat. §§ 465.255-.257, 2013). Statute allows DEQ to enter into prospective purchaser agreements that exempt certain investors or purchasers from state liability, and potentially third party liability, if purchase or lease of a site will provide the state with substantial public benefit, such as substantial environmental cleanup or productive reuse of the property (Oregon DEQ, 2011; Or. Rev. Stat. § 465.327, 2013). Local governments such as the City of Portland and Metro do not have a regulatory role in overseeing site assessment or cleanup.

In Germany, the *Bundes-Bodenschutzgesetz* (Federal Soil Protection Act) regulates soil protection and remediation of contaminated sites. Initially approved in 1998, it became effective in March, 1999 and superseded state level regulations, such as those enacted by North Rhine-Westphalia in 1995 (MUNLV et al., 2004). Supplementary *Landesbodenschutzgesetz* (State Soil Protection Act) regulations adopted by North Rhine-Westphalia in 2000 address topics such as notification for potential contamination, roles of local and state agencies, and data sharing amongst those agencies (MIK NRW, 2015a).

The Federal Soil Protection Act includes as legally liable persons the polluter, the present owner and occupier, certain former owners, as well as legal successors and a person liable under commercial or company law for a legal person who is the owner of a contaminated site (CABERNET, 2003; Rehbinder, 2004). Lenders are normally not liable, but can become liable if he or she voluntarily takes possession or becomes an operator of contaminated property (Rehbinder, 2004). Responsibility where it exists is strict, unlimited and fault is not required (Rehbinder, 2004).

The German federal states have authority for implementation of the *Bundes-Bodenschutzgesetz*. This authority is often delegated to municipalities, as is the case in North Rhine-Westphalia. In Düsseldorf, the city Umweltamt (Environment Department) is responsible for overseeing assessment and cleanup of contaminated sites. Seven staff at the Environment Department work on contaminated site issues and 22 staff are dedicated to addressing groundwater pollution (Derenthal, interview, December 10, 2014).

## **5.2 Data Investigation and Availability**

The City of Düsseldorf has conducted thorough investigation to identify potentially contaminated sites. It began inventorying previous uses of land in the city in 1986, identifying legacy sites using historical maps, address books, building plans and company information and former dumps by examining aerial photographs and topographic maps (Landeshauptstadt Düsseldorf Umweltamt,

2013). City staff also makes entries in the land registry when an operation that handles hazardous substances shuts down (Landeshauptstadt Düsseldorf Umweltamt, 2013). Similarly, in Portland as part of the Portland Brownfield Assessment, historical business records were examined to identify locations of potentially contaminated sites (City of Portland BPS, 2012a). However, the effort did not include use of historical maps or photos (Bump, personal communication, April 10, 2015).

Notably, data about sites in Düsseldorf is not necessarily available to the public. Information in the Düsseldorf land registry on former dumps and defunct facilities is governed by data privacy for individual cases, which means the involvement of the property owner shall be verified before the Environment Department discloses data about a site (Landeshauptstadt Düsseldorf Umweltamt, 2013).

The Oregon Department of Environmental Quality maintains the Environmental Cleanup Site Information (ECSI) database of sites suspected to be contaminated, confirmed to be contaminated, or previously contaminated with hazardous substances as well as the Leaking Underground Storage Tanks (LUST) database for petroleum tanks (Oregon DEQ, n.d.-a, n.d.-b).<sup>10</sup> Sites are typically added to the databases based on reports of actual or suspected contamination made to DEQ, or groups of sites may be added to the ECSI database because they are located in a study area related to area-wide contamination, for instance of groundwater (Oregon DEQ, n.d.-a, 2009). Both databases are publicly accessible online (Oregon DEQ, n.d.-a, n.d.-b). Data from Oregon suggests that collection, verification and public disclosure of information on contamination can spur participation in voluntary cleanup programs (Blackman et al., 2010). The Portland Bureau of Planning and Sustainability also recently published an interactive online map of brownfields in the city that automatically updates based on a direct link to the DEQ LUST and ECSI databases (Bump, personal communication, March 5, 2015; City of Portland BPS, n.d.).

### **5.3 Contaminated Site Assessment and Cleanup**

The City of Düsseldorf is situated atop a shallow alluvial aquifer and strong local sentiment exists about water quality and drinking water supplies (Derenthal, interview, December 10, 2014). The City Council approved use of groundwater for the public drinking water supply in 1868 and five waterworks for the system currently exist in the urban area (Landeshauptstadt Düsseldorf Stadtplanungsamt, 2013a). However, 14 cases of large-scale groundwater contamination are known in the urban area and, as of 2011, 34 groundwater remediation systems were being operated in the city (Landeshauptstadt Düsseldorf Stadtplanungsamt, 2013a). In some cases groundwater flows through old waste deposits in Düsseldorf, which can be two meters to twelve meters deep (Derenthal, personal communication, March 13, 2015). The European Water Framework Directive established a legal target of December 22, 2015 for bringing groundwater to good chemical status (Directive 2000/60/EU, 2000). Given the extent of contamination, however, Düsseldorf will not meet the target and is planning to seek two six-year extensions for completing remediation of the contamination (Landeshauptstadt Düsseldorf Stadtplanungsamt, 2013a).

The City of Düsseldorf requires that assessment of potential soil contamination be conducted on any previously developed property where new development is proposed, and then determines remediation requirements based on those findings (Derenthal, interview, December 10, 2014). The policy approach promotes consistent and systematic assessment and remediation of pollution, but is also largely made possible by strong market demand for development and redevelopment sites. In this sense, the requirement to conduct assessment is intertwined with the city's strategy of limiting the supply of greenfield sites and optimizing existing urban sites for development. In another sense, the systematic approach to requiring assessment counterbalances strict limitations on the public availability of site contamination data.

The Oregon Department of Environmental Quality administers two voluntary programs that accounted for fourteen times as many brownfield cleanups completed from 2005 to 2014 in the state than through

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<sup>10</sup> The US EPA also maintains a national database of sites with confirmed contamination called CERCLIS. DEQ adds all CERCLIS or former CERCLIS sites in Oregon to the ECSI database (Oregon DEQ, n.d.).

mandatory enforcement actions: the Voluntary Cleanup Program (VCP) and the Independent Cleanup Pathway (ICP) (Oregon DEQ, 2015). The VCP involves direct traditional real-time DEQ oversight (including of site cleanup plan development), whereas the ICP offers a streamlined process for managers of low and medium priority brownfields, in which DEQ reviews and acts only on a submitted final report (Oregon DEQ, 2005a, 2005b; Wistar, personal communication, September 8, 2015). Blackman et al. found evidence suggesting Oregon's dual programs appeal to sites with low contamination and high development potential as well as those sites under pressure to remediate from regulators or other stakeholders, presumably promoting higher participation by each type (2010).

Upon successful completion of a cleanup action, DEQ issues a No Further Action (NFA) letter.<sup>11</sup> Though a NFA does not provide liability protection, it does provide property owners a high level of certainty that DEQ will not require additional future cleanup based on the known extent of contamination (Oregon DEQ, 2007). Innocent purchasers of brownfield sites are also able to negotiate a Prospective Purchaser Agreement with DEQ in advance of the purchase, which provides protection against state liability, and potentially third party liability, for existing contamination in exchange for substantial public benefit (Oregon DEQ, 2011).

Whereas state-level voluntary cleanup programs have become ubiquitous in the US, the approach is not common in western European countries (Wernstedt et al., 2010). Creation of and participation in voluntary cleanup programs has been primarily driven by economic reasons. In a nationwide survey of state officials, they stated that redeveloping more properties, speeding cleanup, reducing contamination stigma, attracting new developers and investors, and improving environmental quality were common motivations for creating voluntary cleanup programs, and they indicated the most significant reasons for property owners to enter a voluntary cleanup program are obtaining a bank loan, making a property transaction, and receiving liability protection (Wernstedt et al., 2010).

#### **5.4 Preventing Future Brownfields**

Emerging German federal government policy addresses prevention of potential future industrial brownfields. The 2010 *EU Directive on Industrial Emissions* (IED) and the corollary German *Bundes-Immissionsschutzgesetz* (Federal Emissions Control Act), enacted in 2013, mandate that operators of new industrial facilities create baseline soil and water quality reports for the site, then measure soil and water quality again upon cessation of activities, and be held liable for a significant increase of pollution of soil or water quality (Bundes-Immissionsschutzgesetz, 2014; Directive 2010/75/EU, 2010). This reporting requirement is specific to activities that produce, use, or release relevant hazardous materials (LABO and LAWA, 2013). German policymakers, like their European counterparts, are currently in the process of determining the definition of 'significant' pollution for purposes of the Federal Emissions Control Act and implementation of the IED (Bieber, interview, April 27, 2015). This new policy has the potential to ensure that site contamination is identified before the property is put to a new use, transferred, or mothballed. However, it does not include a mechanism to ensure that a facility operator has sufficient financial resources to address any future cleanup obligations.

#### **5.5 Public Funding Sources**

Public funding supports brownfield redevelopment in both Oregon and North Rhine-Westphalia. However, funding in North Rhine-Westphalia tends to be targeted to regions of the state outside of Düsseldorf with weaker economic and real estate conditions.

The German Federal Soil Protection Act provides that if the market value of a site is significantly increased through the use of public funds to fulfill obligations under the Act, the owner of the site must pay the public agency the amount of the increased value, up to the amount of the public expenditure, and subtracting the expenses that the owner paid (CABERNET, 2003). The public

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<sup>11</sup> DEQ may also issue a Conditional No Further Action (CNFA) that records formal institutional controls or use restrictions on the property deed.

authority can place a lien on the property to recover the funds in case the property is sold, but in many cases the amount spent exceeds the value of the property (Bieber, interview, April 27, 2015).

Support to assist with site assessment, remediation and preparation in North Rhine-Westphalia is also available through the AAV, the *Verband für Flächenrecycling und Altlastensanierung* (Association for Site Recycling and Contaminated Site Remediation). State statute specifies three state ministries (those for environment, mining, and city planning) and all counties (*Kreise*) and county-free (typically larger) cities (*kreisfreie Städte*) as members; industry entities can also become voluntary members (Arnz, interview, June 23, 2015). The members pay annual fees to fund the AAV: approximately €7 million from the state ministries, €1 million from the counties and cities, and a half million euros from industry (Arnz, interview, June 23, 2015; Hoof and König, personal communication, April 21, 2015). Numerous sites are point sources for groundwater contamination and the state ministries' contribution comes from a statutory water abstraction fee primarily used to support measures implementing the EU Water Framework Directive (Hoof and König, personal communication, April 21, 2015, September 22, 2015). The amount of the water abstraction fee is five cents per cubic meter withdrawn, but a lower rate is charged for cooling water withdrawals and exemptions are provided for certain use withdrawals such as agricultural irrigation and hydropower (MIK NRW, 2015b). To be eligible for AAV involvement, a local public authority must own the site or have declared that remediation is necessary at the site despite the private owner being unable to pay (Arnz, interview, June 23, 2015). However, the AAV has only undertaken one project in Düsseldorf, which is not yet completed (AAV, 2015). Like other large cities in the region, Düsseldorf tends to have internal capacity for addressing assessment and remediation on sites that it owns (Arnz, interview, June 23, 2015).

Public funding is also available to support certain urban development activities in Germany. German Basic Law provides for the Federal government and states to co-finance redevelopment, including land preparation, planning measures, building measures, and repair and modernization measures (CABERNET, 2003). The German Federal government provides financial support to the states, which is then provided on to local authorities to promote local urban development projects (CABERNET, 2003).

North Rhine-Westphalia makes extensive use of the European Regional Development Fund (ERDF) to support parts of the state suffering from economic restructuring processes, such as the Ruhr region. The ERDF is part of the European Union cohesion policy structural funds, which aim to reduce disparities within the EU. The North-Rhine Westphalia ERDF operational program for 2014-2020 includes four priority areas, each with specific investment priorities (MWEIMH, 2014). Preparation for urban development of vacant sites and conversion areas, particularly of large former mines, industrial sites, and military sites, is an investment priority within the priority area of sustainable urban and neighborhood development (MWEIMH, 2014). The operational program aims to spend €93 million by 2018 and €465 million by 2023 on sustainable urban and neighborhood development (MWEIMH, 2014).

In Portland and Oregon, federal and state funds administered by the City of Portland, Portland Development Commission (PDC), and State of Oregon play a significant role in supporting contaminated site assessment and remediation. However, currently available funding sources pale in comparison to an estimated \$214 million financial feasibility gap (\$307 million when Portland Harbor Superfund costs are added) for remediation and redevelopment of Portland brownfields based on current market trends and redeveloped site values (City of Portland BPS, 2012b). Industrial sites account for 77 percent of the financial feasibility gap associated with onsite remediation costs and 84 percent of gap when potential Portland Harbor Superfund liability is considered (City of Portland BPS, 2012b).

The local Portland Brownfield Program administered by the Bureau of Environmental Services currently manages two programs created by US EPA grants in 2011: a \$1 million revolving loan fund to support brownfield remediation and a \$400,000 community-wide site assessment program (City of Portland BES, 2013a). The revolving loan fund provides low interest loans to property owners who are not legally responsible for the contamination, and a portion of the fund is available as grant monies to



property owners who are non-profit organizations. (City of Portland BES, n.d., 2013b; US EPA, 2009b). Both funds are available citywide, but are targeted to properties in east Portland, where lower land values present a barrier to redevelopment of contaminated sites (City of Portland BES, 2013a, 2013b). Since its creation in 1998, the Portland Brownfield Program has leveraged a total of \$4,580,000 in federal funds (City of Portland BES, 2013a). The PDC has also received direct federal grant support for cleanup of contaminated sites and used tax-increment financing to promote redevelopment in designated urban renewal areas, including the Pearl District, RiverPlace, and South Waterfront (De Sousa and D'Souza, 2012; PDC, n.d.; US EPA, 2009a, 2012). PDC also uses property tax increment financing to support redevelopment in blighted areas designated as Urban Renewal Areas.

The Oregon Business Development Department administers the Brownfield Redevelopment Fund, which is traditionally capitalized by revenue from sale of state lottery bonds authorized by the Oregon Legislative Assembly. The fund provides revolving loans and limited grant support to individual property owners to assess and cleanup contamination. In 2015, the Oregon Legislative Assembly authorized \$7 million to recapitalize the fund (2015). The Oregon Business Development Department also administers another similar revolving loan fund called the Oregon Coalition Brownfields Cleanup Fund capitalized through grants from the US EPA. Parties not legally responsible for contamination may apply for loans from the fund to support brownfield cleanup activities; in addition, municipalities and non-profit organizations are eligible to apply for limited grant support (Business Oregon, n.d.).<sup>12</sup>

Oregon also provides funding to clean up certain contaminated sites where the liable party cannot be located or is insolvent. An Industrial Orphan Account provides support for heavily contaminated sites where responsible parties are unknown, unable, or unwilling to clean it up and had a fund balance of approximately \$5 million at the end of the 2014 fiscal year; the account was last capitalized in 2012 with \$7.5 million in bond proceeds authorized by the Oregon State Legislature (Oregon Legislative Committee Services, 2014; Wistar, personal communication, June 1, 2015).

## 6. Discussion and Conclusion

The brownfield redevelopment and urban planning policy frameworks in Düsseldorf and Portland share key similarities in terms of contaminated site liability, risk-based hazard assessment, planning emphasis on urban development and conservation of rural lands, and planning coordination amongst jurisdictions. Düsseldorf employs a brownfield redevelopment strategy that prioritizes the minimization of greenfield development, optimization of development potential for urban sites, and systematic assessment and cleanup of properties as they are redeveloped, with an emphasis on protecting local groundwater supplies. This highlights the potential for a coordinated planning approach combined with sustained economic and population growth to drive brownfield redevelopment via demand for development sites. Notably, the approach of Düsseldorf is supported by federal and state policy that calls for urban development before greenfield development and dramatic reduction in the consumption of greenfield sites, which is perhaps correlated to conceiving of brownfields broadly as previously developed land.

Portland's land use plans and policies promote compact urban growth, and the city has successfully optimized many brownfield sites for mixed use commercial and residential redevelopment, especially near the downtown core. However, much of the city's current emphasis is on seeking to redevelop former industrial sites for industrial use, in part to meet the state requirement for a 20 year supply of developable land for employment. The city and state's brownfield redevelopment strategy is characterized by targeting public incentives and voluntary programs to spur assessment, remediation, and redevelopment of sites. Participation in voluntary cleanup programs is further enhanced through pressure created by public dissemination of contamination information.

The case studies suggest that cities should carefully consider the opportunities for enhancing the financial feasibility of redevelopment through site-specific planning interventions such as rezoning

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<sup>12</sup> Business Oregon is the trade name of the Oregon Business Development Department.

and broader planning interventions such as restricting competition from greenfield sites, yet also highlight the importance of investing public funds to improve the economic feasibility of remediation and redevelopment of sites with use restrictions or low values. These alternatives further suggest that public funding and incentives should be carefully targeted to sites not expected to become economically feasible for redevelopment within a reasonable time horizon given the planning regime and market dynamics, but where there is a compelling public interest for remediation and redevelopment and retention of certain use restrictions exists. For instance, industrial-zoned land may have low property values and substantial public benefits from redevelopment in terms of economic development and increased employment or business tax revenue. Yet large amounts of industrial development can be driven by a booming economy, as is currently occurring in Portland (Reed, personal communication, August 17, 2015). Financial feasibility analysis in Portland and the experience of North Rhine-Westphalia show that the targeted incentive and funding approach can require large investments and ultimately significant infusions of external capital.

Comparing the approaches in Düsseldorf and Portland raises numerous additional questions for consideration: would greater public availability of contaminated site data in Düsseldorf increase pressure to remediate sites and translate to increased rates of redevelopment? Does public concern for water quality in Portland present opportunities for increased or dedicated funding to address brownfields? Could brownfield program activities be more closely integrated with groundwater protection efforts in Oregon? To what extent do German and European efforts to prevent future industrial brownfields serve as a model?

The research conducted for this paper did not examine policies to address economic and sociodemographic issues associated with increasing land values. Housing affordability, gentrification, and demolition of historic resources are all challenges currently facing Portland. Goodling et al. point to period of capital-switching since the 1990s in Portland involving sustainability investments in the central city and devaluation of outer East Portland neighborhoods (2015). A recent study found that 58 percent of Portland's lower-priced neighborhoods gentrified since 2000, the highest rate of the 50 largest cities in the US (Maciag, 2015). The number of housing units affordable at 60% of median family income and below in the central city area of Portland has declined 17.7% since 2002, despite a "No Net Loss" policy for such units adopted 2001 (Portland Housing Bureau, 2015). Two years ago the City of Portland completed a study of displacement and gentrification and today gentrification, displacement and housing policy are hot topics in local media (Bates, 2013; King, 2015a, 2015b; Mesh, 2015; Schmidt, 2015). A coalition of two dozen community groups recently successfully lobbied the City to include several anti-displacement policies in the draft *Comprehensive Plan Update* (Bell, 2015). Housing advocates have called for increasing the share of tax increment financing resources in urban renewal areas spent on affordable housing from the 30 percent dedication made a decade ago to 50 percent, and Portland's elected officials are proposing new policies and fees to address tenant displacement, home demolitions, and housing affordability (Law, 2015a, 2015b, 2015c; Portland Housing Bureau, n.d.; Redden, 2015).

In Germany, a majority of people rent rather than own housing and federal law provides strong legal protections for tenants, including restricting the eviction authority of landlords to cases with cause or a justified interest, which may not include the possibility of attaining higher rent from others (German Civil Code, 2013; OHCHR, 2013). Rental housing is perceived as almost as secure as owner-occupied housing and tenancy security law is considered well-balanced by all actors and has been largely unchanged for decades (de Boer and Bitetti, 2014). Rent increases are regulated based on a survey of comparable local rents and a recent change in federal law being implemented in Düsseldorf and other tight housing markets limits rent increases to 10 percent per year, though the new policy has been criticized one the one hand for creating a disincentive for investments in the rental sector and on the other for lacking penalties and putting the burden of enforcement on renters (de Boer and Bitetti, 2014; "German Parliament Passes Law", 2015; Kowalewsky, 2015; Scaturro, 2015). Düsseldorf also employs a baseline affordable housing quota for developers, combined with plan-area specific quotas and an affordable housing construction fund (Landeshauptstadt Düsseldorf Stadtplanungsamt, 2013b).

This paper highlights a diversity of brownfield redevelopment policy tools and the potential for integrating brownfield policy with other aspects of urban policy. Further research could explore the relationship between brownfield and infill redevelopment policy and housing policy in Portland and Düsseldorf, as well as specific redevelopment case studies to illustrate the application of policies and planning instruments. Moreover, comparative studies between Portland and select other German cities with similar economic and governance traits would strengthen the potential for more general conclusions. For instance, Hannover and Stuttgart are amongst the only German cities with directly elected regional governments (both with planning competency). A growing body of literature presents comparative information on regional governance systems, land redevelopment, and reurbanization in Portland and Stuttgart (Brombach et al., 2015; Jessen and Mayer, 2010a, 2010b; Kidokoro et al., 2008). Such comparative study allows for consideration of policy details in a different light than comparative study of domestic peers, especially when cities such as Portland and Düsseldorf are in certain respects special cases within their respective countries.

## Bibliography

- 107<sup>th</sup> Congress (2002), *Small Business Liability Relief and Brownfield Revitalization Act, Public Law 107-118*, [www.gpo.gov/fdsys/pkg/PLAW-107publ118/html/PLAW-107publ118.htm](http://www.gpo.gov/fdsys/pkg/PLAW-107publ118/html/PLAW-107publ118.htm).
- Abbott, Carl and Margery Post Abbott (1991), “A History of Metro”, *Urban Studies and Planning Faculty Publications and Presentations*, Paper 109, [http://pdxscholar.library.pdx.edu/usp\\_fac/109](http://pdxscholar.library.pdx.edu/usp_fac/109).
- AAV (Verband für Flächenrecycling und Altlastensanierung) [Association for Brownfield Redevelopment and Remediation of Contaminated Sites] (2015, May), *Jahresbericht 2014*, AAV, Hattingen, Germany, [www.aav-nrw.de/Service/jahresberichte/00\\_Jahresberichte\\_neu/aav\\_jahresbericht\\_2014.pdf](http://www.aav-nrw.de/Service/jahresberichte/00_Jahresberichte_neu/aav_jahresbericht_2014.pdf).
- Bates, Lisa K (2013), *Gentrification and Displacement Study: implementing an equitable inclusive development strategy in the context of gentrification, updated 5/18/13*, commissioned by City of Portland, Bureau of Planning and Sustainability, Portland, OR, [www.portlandoregon.gov/bps/article/454027](http://www.portlandoregon.gov/bps/article/454027).
- Baugesetzbuch in der Fassung der Bekanntmachung vom 23. September 2004 (BGBl. I S. 2414), das zuletzt durch Artikel 1 des Gesetzes vom 20. November 2014 (BGBl. I S. 1748) geändert worden ist* [Federal Building Code in the version published on September 23, 2004 (Federal Law Gazette I p. 2414), last amended by Article 1 of the Law dated November 20, 2014 (Federal Law Gazette I p. 1748)] (2014), [www.gesetze-im-internet.de/bundesrecht/bbaug/gesamt.pdf](http://www.gesetze-im-internet.de/bundesrecht/bbaug/gesamt.pdf), last accessed March 30, 2015.
- Baum-Snow, Nathaniel and Daniel Hartley (2015), “Demographic Changes in and near US Downtowns. Federal Reserve Bank of Cleveland”, [www.clevelandfed.org/en/Newsroom%20and%20Events/Publications/Economic%20Trends/2015/et%2020150605%20demographic%20changes%20in%20and%20near%20us%20downtowns.aspx](http://www.clevelandfed.org/en/Newsroom%20and%20Events/Publications/Economic%20Trends/2015/et%2020150605%20demographic%20changes%20in%20and%20near%20us%20downtowns.aspx), last accessed August 11, 2015.
- BBR (Bundesamt für Bauwesen und Raumordnung) [German Federal Office for Building and Regional Planning] (2000), *Urban Policy and Development in Germany: An Overview*, BBR, Bonn, Germany, [www.bbsr.bund.de/BBSR/EN/Publications/CompletedSeries/Berichte/2000\\_2009/Bd06UrbanDevelopment.html](http://www.bbsr.bund.de/BBSR/EN/Publications/CompletedSeries/Berichte/2000_2009/Bd06UrbanDevelopment.html).
- Bell, John (2015, July 29), “City will consider adopting affordable housing, anti-displacement language into comprehensive plan”, *Portland Business Journal*, [www.bizjournals.com/portland/blog/real-estate-daily/2015/07/city-will-consider-adopting-affordable-housing.html](http://www.bizjournals.com/portland/blog/real-estate-daily/2015/07/city-will-consider-adopting-affordable-housing.html), last retrieved August 12, 2015.
- Bezirksregierung Düsseldorf [Düsseldorf District Government] (2011, November) *GEP 99: Gebietsentwicklungsplan für den Regierungsbezirk Düsseldorf, Mai 2000 (Aktualisierung November 2011)* [Area Development Plan for the Governmental District Düsseldorf, May 2000 (updated November 2011)], [www.brd.nrw.de/planen\\_bauen/regionalplan/gepdownload.html](http://www.brd.nrw.de/planen_bauen/regionalplan/gepdownload.html).
- Bezirksregierung Düsseldorf (2014), *Regionalplan Düsseldorf, Entwurf – Stand: August 2014* [Düsseldorf Regional Plan, Draft – As of: August 2014], [www.brd.nrw.de/planen\\_bauen/regionalplan/pdf\\_rpd\\_e\\_082014/Layout\\_RPD-E\\_Text\\_2014\\_06\\_05.pdf](http://www.brd.nrw.de/planen_bauen/regionalplan/pdf_rpd_e_082014/Layout_RPD-E_Text_2014_06_05.pdf).
- Bieber, Andreas (2014, May 13), “Contaminated Sites Situation in Germany” [Presentation at Common Forum on Contaminated Land meeting], Berlin, [www.commonforum.eu/Documents/Meetings/2014/Berlin/1\\_Cont\\_Sites-Situation\\_in\\_G-140512b.pdf](http://www.commonforum.eu/Documents/Meetings/2014/Berlin/1_Cont_Sites-Situation_in_G-140512b.pdf), last accessed April 1, 2015.

- Blackman, Allen, Sarah Darley, Thomas P Lyon, and Kris Wernstedt (2010), “What Drives Participation in State Voluntary Cleanup Programs? Evidence from Oregon”, *Land Economics* 86 (4), pp. 785–799.
- BMUB (Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit) [Federal Ministry for Environment, Nature Conservation, Building and Nuclear Safety] (1998), “Mit dem Entwurf eines umweltpolitischen Schwerpunktprogrammes neue Etappe in der Umweltpolitik eingeleitet” [New Phase in Environmental Policy Initiated with the Draft Environmental Policy Priority Program], Bonn, Germany, [www.bmub.bund.de/N675/](http://www.bmub.bund.de/N675/), last accessed August 5, 2015.
- Brezzi, Monica, Mario Piacentini, Konstantin Rosina, and Daniel Sanchez-Serra (2012), “Redefining urban areas in OECD countries”, in OECD, *Redefining "Urban": A New Way to Measure Metropolitan Areas*, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264174108-4-en>.
- Brombach, Karoline, Johann Jessen, Stefan Siedentop, and Philipp Zakrzewski (2015), “Reurbanisierung in den USA und Deutschland: Eine vergleichende Untersuchung der Ursachen und räumlichen Ausprägungen von demographischen Reurbanisierungsprozessen in den Stadtregionen Portland (USA) und Stuttgart (D), Diskussionspapier für den Evaluationsworkshop am 01.07.2015” [Reurbanization in the US and Germany: A comparative study of the causes and spatial characteristics of demographic reurbanization processes in the Portland (United States) and Stuttgart (D) metropolitan regions, discussion paper for the evaluation workshop on July 1, 2015], Städtebau-Institut, Universität Stuttgart and Institut für Landes- und Stadtentwicklungsforschung (ILS), Stuttgart and Dortmund, Germany.
- Bump, Tyler (2013), “Staff Report on Portland Brownfield Redevelopment Assessment”, memorandum to Planning & Sustainability Commission, City of Portland Bureau of Planning and Sustainability, <http://efiles.portlandoregon.gov/Record/5513595/File/Document>.
- Bundes-Bodenschutzgesetz vom 17. März 1998 (BGBl. I S. 502), das zuletzt durch Artikel 5 Absatz 30 des Gesetzes vom 24. Februar 2012 (BGBl. I S. 212) geändert worden ist* [Federal Soil Protection Act of March 17, 1998 (Federal Law Gazette I, p. 502), last amended by Article 5, paragraph 30 of the Law of February 24, 2012 (Federal Law Gazette I, p. 212)] (2012), [www.gesetze-im-internet.de/bundesrecht/bbodschg/gesamt.pdf](http://www.gesetze-im-internet.de/bundesrecht/bbodschg/gesamt.pdf), last accessed April 2, 2015.
- Bundes-Immissionsschutzgesetz in der Fassung der Bekanntmachung vom 17. Mai 2013 (BGBl. I S. 1274), das zuletzt durch Artikel 1 des Gesetzes vom 20. November 2014 (BGBl. I S. 1740) geändert worden ist* [Federal Pollution Control Act in the version published on May 17, 2013 (Federal Law Gazette I, p. 1274), last amended by Article 1 of the Law of November 20, 2014 (Federal Law Gazette I p. 1740)] (2014), [www.gesetze-im-internet.de/bundesrecht/bimschg/gesamt.pdf](http://www.gesetze-im-internet.de/bundesrecht/bimschg/gesamt.pdf), last accessed August 11, 2015.
- Bundesregierung [German Federal Government] (2002), *Perspektiven für Deutschland: Unsere Strategie für eine nachhaltige Entwicklung* [Perspectives for Germany: Our Strategy for Sustainable Development], [www.bundesregierung.de/Content/DE/Anlagen/Nachhaltigkeit-wiederhergestellt/perspektiven-fuer-deutschland-langfassung.pdf](http://www.bundesregierung.de/Content/DE/Anlagen/Nachhaltigkeit-wiederhergestellt/perspektiven-fuer-deutschland-langfassung.pdf).
- Burns, Steven A and Kerry F Nelson (2007, September), “The New Standard for ‘All Appropriate Inquiries’”, *GP Solo Law Trends & News* 3(2), [www.americanbar.org/newsletter/publications/law\\_trends\\_news\\_practice\\_area\\_e\\_newsletter\\_home/allappropriateinquiries.html](http://www.americanbar.org/newsletter/publications/law_trends_news_practice_area_e_newsletter_home/allappropriateinquiries.html).
- Business Oregon (Oregon Business Development Department) (n.d.), “Oregon Coalition Brownfields Cleanup Fund” [fact sheet], [www.orinfrastructure.org/assets/docs/brownfieldsc.pdf](http://www.orinfrastructure.org/assets/docs/brownfieldsc.pdf), last accessed November 11, 2014.

- Business Oregon (2015), “Brownfields Remediation Spurs Economic Growth”, exhibit of the Oregon House Committee on Rural Communities, Land Use and Water, February 17, 2015, <https://olis.leg.state.or.us/liz/2015R1/Downloads/CommitteeMeetingDocument/47396>.
- CABERNET (Concerted Action on Brownfield and Economic Regeneration Network) (2003), “State of the Art - Country Profile: Germany”, [www.cabernet.org.uk/resourceefs/136.pdf](http://www.cabernet.org.uk/resourceefs/136.pdf), last accessed January 26, 2015.
- City of Düsseldorf (2011, April), *OPENCities Local Action Plan: URBACT II*, [www.opencities.eu/web/download/local\\_action\\_plans/lap\\_dusseldorf.pdf](http://www.opencities.eu/web/download/local_action_plans/lap_dusseldorf.pdf).
- City of Düsseldorf and Partners (n.d.) *Düsseldorf – Discover Excellence in All Its Facets: Facts and Figures for Investors and Developers 2013/2014*, Düsseldorf, [www.duesseldorf.de/wirtschaftsfoerderung/pdf/facts\\_for\\_investors.pdf](http://www.duesseldorf.de/wirtschaftsfoerderung/pdf/facts_for_investors.pdf), last accessed August 4, 2015.
- City of Portland (2012, April), *The Portland Plan*, [www.portlandonline.com/portlandplan/index.cfm?c=58776&a=398384](http://www.portlandonline.com/portlandplan/index.cfm?c=58776&a=398384).
- City of Portland BES (Bureau of Environmental Services) (n.d.), “Portland Brownfield Program Services”, [www.portlandoregon.gov/bes/article/316740](http://www.portlandoregon.gov/bes/article/316740), last accessed August 5, 2015.
- City of Portland BES (2013a), *Portland Brownfield Program Annual Report July 2012 – June 2013*, [www.portlandoregon.gov/bes/article/457784](http://www.portlandoregon.gov/bes/article/457784).
- City of Portland BES (2013b), “Portland revolving fund begins issuing brownfield cleanup loans” [press release], [www.portlandoregon.gov/bes/article/443351](http://www.portlandoregon.gov/bes/article/443351), last accessed August 5, 2015.
- City of Portland BPS (Bureau of Planning and Sustainability) (n.d.), *Brownfields and Contaminated Sites: the Portland Bureau of Planning and Sustainability's Brownfield Inventory Program* [interactive map]. [www.portlandmaps.com/bps/brownfields/](http://www.portlandmaps.com/bps/brownfields/), last accessed March 5, 2015.
- City of Portland BPS (2012a), *Appendices to the Portland Brownfield Assessment, Final Report*, prepared by Maul Foster & Alongi, Inc., ED Hovee & Company, LLC, ECONorthwest and Redevelopment Economics, [www.portlandoregon.gov/bps/article/502822](http://www.portlandoregon.gov/bps/article/502822).
- City of Portland BPS (2012b), *Portland Brownfield Assessment, Final Report*, prepared by Maul Foster & Alongi, Inc., ED Hovee & Company, LLC, ECONorthwest, and Redevelopment Economics, [www.portlandoregon.gov/BPS/article/502821](http://www.portlandoregon.gov/BPS/article/502821).
- City of Portland BPS (2015a), “Policies and Goals, Chapter 3: Urban Form”, in *Comprehensive Plan Update, Draft Recommended Plan, June 2015*, [www.portlandoregon.gov/bps/article/532777](http://www.portlandoregon.gov/bps/article/532777), last accessed August 4, 2015.
- City of Portland BPS (2015b), “Policies and Goals, Chapter 6: Economic Development”, in *Comprehensive Plan Update, Draft Recommended Plan, June 2015*, [www.portlandoregon.gov/bps/article/532781](http://www.portlandoregon.gov/bps/article/532781), last accessed August 4, 2015.
- City of Portland BPS (2015c), “Policies and Goals, Chapter 7: Environment and Watershed Health”, in *Comprehensive Plan Update, Draft Recommended Plan, June 2015*, [www.portlandoregon.gov/bps/article/532782](http://www.portlandoregon.gov/bps/article/532782), last accessed August 4, 2015.
- City of Portland BPS (2015d), “Policies and Goals, Chapter 9: Transportation”, in *Comprehensive Plan Update, Draft Recommended Plan, June 2015*, [www.portlandoregon.gov/bps/article/532784](http://www.portlandoregon.gov/bps/article/532784), last accessed August 4, 2015.
- City of Portland BPS (2015e), “Draft Recommended Comprehensive Plan” [webpage], [www.portlandoregon.gov/bps/67708](http://www.portlandoregon.gov/bps/67708), last accessed August 4, 2015.

- Christensen, Nick (March 26, 2015), “Portland region grows to 2.35 million residents, Census estimates, with newcomers leading the way”, *Metro News*, Metro, Portland, OR, [www.oregonmetro.gov/news/portland-region-grows-235-million-residents-census-estimates-newcomers-leading-way](http://www.oregonmetro.gov/news/portland-region-grows-235-million-residents-census-estimates-newcomers-leading-way), last accessed July 30, 2015.
- Cortright, Joe (2015), *City Report: Surging City Center Job Growth*, City Observatory, <http://cityobservatory.org/wp-content/uploads/2015/02/Surging-City-Center-Jobs.pdf>.
- de Boer, Rik and Rosamaria Bitetti (2014), “A Revival of the Private Rental Sector of the Housing Market?: Lessons from Germany, Finland, the Czech Republic and the Netherlands”, *OECD Economics Department Working Papers*, No. 1170, OECD Publishing, Paris, <http://dx.doi.org/10.1787/5jxv9f32j0zp-en>.
- De Sousa, Christopher and Lily-Ann D’Souza (2012, October), “South Waterfront District, Portland, OR: A Sustainable Brownfield Revitalization Best Practice”, University of Illinois at Chicago, Institute for Environmental Science and Policy, Chicago, [www.uic.edu/orgs/brownfields/research-results/documents/PortlandSouthWaterfrontFinalforPosting10-29-12.pdf](http://www.uic.edu/orgs/brownfields/research-results/documents/PortlandSouthWaterfrontFinalforPosting10-29-12.pdf).
- DIFU (Deutsches Institut für Urbanistik) [German Institute for Urbanism] (2008), “Paths to Sustainable Land Management – Topics and Research Projects in the REFINA Research Programme” [brochure], Berlin, <http://edoc.difu.de/edoc.php?id=QPUFXL6Y>.
- Directive 2000/60/EU of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (2000), *Official Journal of the European Communities*, L327/1.
- Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (2010), *Official Journal of the European Union*, L334/17.
- Environmental Law Institute (2002), *An Analysis of State Superfund Programs: 50-State Study, 2001 Update*, Environmental Law Institute, Washington, DC, [www.eli.org/sites/default/files/eli-pubs/d12-10a.pdf](http://www.eli.org/sites/default/files/eli-pubs/d12-10a.pdf).
- European Cluster Observatory (2011), “Strong Clusters in Innovative Regions”, Center for Strategy and Competitiveness, CSC, Stockholm School of Economics, May 2011, [www.clusterobservatory.eu/common/galleries/downloads/Strong\\_Clusters\\_in\\_Innovative\\_Regions\\_Report.pdf](http://www.clusterobservatory.eu/common/galleries/downloads/Strong_Clusters_in_Innovative_Regions_Report.pdf), last accessed August 13, 2015.
- European Cluster Observatory (2014), *European Cluster Panorama 2014*, European Commission, <http://ec.europa.eu/DocsRoom/documents/7242/attachments/1/translations/en/renditions/native>, last accessed August 13, 2015.
- European Commission (2011), *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Roadmap to a Resource Efficient Europe*, Brussels, 20.9.2011, COM(2011) 571 final.
- Ewing, Reid, Rolf Pendall, and Don Chen (2002), *Measuring Sprawl and Its Impact*, Smart Growth America, Washington, DC, [www.smartgrowthamerica.org/documents/MeasuringSprawl.PDF](http://www.smartgrowthamerica.org/documents/MeasuringSprawl.PDF).
- Ganser, Robin and Katie Williams (2007), “Brownfield Development: Are We Using the Right Targets? Evidence from England and Germany”, *European Planning Studies* 15 (5), pp. 603-622, <http://dx.doi.org/10.1080/09654310600852654>.
- German Civil Code in the version promulgated on 2 January 2002 (Federal Law Gazette [Bundesgesetzblatt] I page 42, 2909; 2003 I page 738), last amended by Article 4 para. 5 of the*

- Act of 1 October 2013 (Federal Law Gazette I page 3719) (2013)*, translation provided by the Langenscheidt Translation Service, Bundesministerium der Justiz und für Verbraucherschutz [Federal Ministry of Justice and Consumer Protection], [www.gesetze-im-internet.de/englisch\\_bgb/englisch\\_bgb.html#p1928](http://www.gesetze-im-internet.de/englisch_bgb/englisch_bgb.html#p1928), last accessed August 13, 2015.
- German Federal Statistical Office and the statistical offices of the Länder (2015), *Regional Database Germany*, [www.regionalstatistik.de](http://www.regionalstatistik.de), last accessed July 31, 2015.
- “German Parliament Passes Law to Cap Sharp Rent Rises” (2015, March 5), *Deutsche Welle*, <http://dw.com/p/1EmIP>.
- Gesetz zur Erleichterung von Planungsvorhaben für die Innenentwicklung der Städte [Act to Facilitate Planning Projects for the Inner Development of Cities] (2006), *Bundesgesetzblatt Jahrgang Teil I, Nr. 64*, ausgegeben zu Bonn am 27. Dezember 2006 [*Federal Law Gazette Part I, No. 64*, published in Bonn on 27 December 2006], [www.bgbl.de/xaver/bgbl/start.xav?startbk=Bundesanzeiger\\_BGBl&jumpTo=bgbl106s3316.pdf](http://www.bgbl.de/xaver/bgbl/start.xav?startbk=Bundesanzeiger_BGBl&jumpTo=bgbl106s3316.pdf).
- Gesetz zur Neufassung des Raumordnungsgesetzes und zur Änderung anderer Vorschriften (GeROG) [Act to Revise the Spatial Planning Act and Amending Other Provisions (GeROG)] (2008), *Bundesgesetzblatt Jahrgang Teil I, Nr. 65*, ausgegeben zu Bonn am 30. Dezember 2008 [*Federal Law Gazette Part I, No. 65*, published in Bonn on 30 December 2008], [www.bgbl.de/xaver/bgbl/start.xav?startbk=Bundesanzeiger\\_BGBl&jumpTo=bgbl108s2986.pdf](http://www.bgbl.de/xaver/bgbl/start.xav?startbk=Bundesanzeiger_BGBl&jumpTo=bgbl108s2986.pdf).
- Goodling, Erin, Jamaal Green, and Nathan McClintock (2015), “Uneven Development of the Sustainable City: Shifting Capital in Portland, Oregon”, *Urban Geography* 36(4), 504-527, <http://dx.doi.org/10.1080/02723638.2015.1010791>.
- Grimski, Detlef and Uwe Ferber (2001), “Urban brownfields in Europe”, *Land Contamination & Reclamation* 9(1), pp. 143–148, <http://dl.dropbox.com/u/67964190/09-01-14.pdf>.
- Grimski, Detlef and Fabian Dosch (2010), “Brownfield management in Germany: A sustainable issue”, *Journal of Urban Regeneration and Renewal* 3(3), pp. 246-262.
- Hartley, Daniel A, Nikhil Kaza and T William Lester (2015), “Are America’s Inner Cities Competitive? Evidence from the 2000s”, Working Paper 15-03, Federal Reserve Bank of Cleveland, <http://ssrn.com/abstract=2584493>.
- Hermann, Christopher R, Joan P Snyder and Paul S Logan (2003), “The Unanswered Question of Environmental Insurance Allocation in Oregon Law”, *Willamette Law Review* 39(3), Summer 2003, <http://willamette.edu/law/pdf/review/39-3/hermann.pdf>.
- Hirt, Sonia (2007), “The Devil Is in the Definitions: Contrasting American and German Approaches to Zoning”, *Journal of the American Planning Association* 73 (4), pp. 436–450, <http://dx.doi.org/10.1080/01944360708978524>.
- Hirt, Sonia (2010), “To Zone or Not to Zone? Comparing European and American Land-use Regulation”, *PND-Online* 2010 (II), [www.planung-neu-denken.de/images/stories/pnd/dokumente/2\\_2010/hirt.pdf](http://www.planung-neu-denken.de/images/stories/pnd/dokumente/2_2010/hirt.pdf).
- Homolac, Karen (2011), “Regional Legislative Update – Oregon”, [presentation at *Turning Liabilities into Assets in the Inland Northwest*, May 12, 2011, Spokane, WA], [www.eiseverywhere.com/file\\_uploads/e6a2e571398264770dc16b98ce841d3f\\_Karen\\_Homolac.pdf](http://www.eiseverywhere.com/file_uploads/e6a2e571398264770dc16b98ce841d3f_Karen_Homolac.pdf), last accessed August 20, 2015.
- Jaeger, William K and Andrew J Plantinga (2007, June), “How Have Land-Use Regulations Affected Property Values in Oregon?”, Special Report 1077, Oregon State University Extension Service, Corvallis, OR, <https://catalog.extension.oregonstate.edu/sr1077>.



- Jessen, Johann and Heike Mayer (2010a), “Regional Competitiveness and Quality of Life: The Case of Portland and Stuttgart”, *PND-Online* 2010(II), pp. 1-17, [www.planung-neu-denken.de/images/stories/pnd/dokumente/2\\_2010/jessen\\_mayer.pdf](http://www.planung-neu-denken.de/images/stories/pnd/dokumente/2_2010/jessen_mayer.pdf).
- Jessen, Johann and Heike Mayer (2010b), “Reurbanisierung und Flächenrecycling – Portland und Stuttgart” [Reurbanization and Site Recycling – Portland and Stuttgart], in Fabian Dosch and Susanne Glöckner (Eds.), *Informationen zur Raumentwicklung* [Information on Spatial Development] 2010(1), pp. 27-41, Bundes Institut für Bau-, Stadt- und Raumforschung im Bundesamt für Bauwesen und Raumordnung [German Federal Institute for Research on Building, Urban Affairs and Spatial Development within the Federal Office for Building and Regional Planning], [www.bbr.bund.de/BBSR/DE/Veroeffentlichungen/IzR/2010/1/Inhalt/DL\\_JessenMayer.pdf](http://www.bbr.bund.de/BBSR/DE/Veroeffentlichungen/IzR/2010/1/Inhalt/DL_JessenMayer.pdf).
- Juday, Luke J (2015), “The Changing Shape of American Cities. University of Virginia, Demographics Research Group, Weldon Cooper Center for Public Service”, [www.coopercenter.org/sites/default/files/node/13/ChangingShape-AmericanCities\\_UVAcoopercenter\\_March2015.pdf](http://www.coopercenter.org/sites/default/files/node/13/ChangingShape-AmericanCities_UVAcoopercenter_March2015.pdf), last accessed March 30, 2015.
- Kidokoro, Tetsuo, Noboru Harata, Leksono Probo Subanu, Johann Jessen, Alain Motte, and Ethan Paul Seltzer (Eds.) (2008), *Sustainable City Regions: Space, Place and Governance*, Springer, Tokyo.
- King, Shelby R (2015a, June 17), “Out of Control: Why Rent Control Could Help Portland,” *Portland Mercury*, [www.portlandmercury.com/portland/out-of-control/Content?oid=15864257](http://www.portlandmercury.com/portland/out-of-control/Content?oid=15864257), last accessed August 12, 2015.
- King, Shelby R (2015b, September 9), “A Summer of Evictions: Portland Renters are in a State of Emergency”, *Portland Mercury*, [www.portlandmercury.com/portland/a-summer-of-evictions/Content?oid=16451144](http://www.portlandmercury.com/portland/a-summer-of-evictions/Content?oid=16451144), last accessed September 14, 2015.
- Kommission Bodenschutz des Umweltbundesamtes [Soil Protection Commission of the Federal Environment Agency] (2009, December), *Flächenverbrauch einschränken – jetzt handeln: Empfehlungen der Kommission Bodenschutz beim Umweltbundesamt* [Limiting Land Consumption - To Act Now: Recommendations of the Soil Protection Commission at the Federal Environment Agency], Dessau-Roßlau, [www.umweltbundesamt.de/sites/default/files/medien/479/publikationen/e6e82d01.pdf](http://www.umweltbundesamt.de/sites/default/files/medien/479/publikationen/e6e82d01.pdf), last accessed September 7, 2015.
- Kowalewsky, Reinhard (2015, June 24), “Was die Mietpreisbremse bewirkt” [What is the Effect of the Rent Price Brake Law], *RP Online*, Düsseldorf, [www.rp-online.de/wirtschaft/was-die-mietpreisbremse-bewirkt-aid-1.5188128](http://www.rp-online.de/wirtschaft/was-die-mietpreisbremse-bewirkt-aid-1.5188128).
- Kunzmann, Klaus R (2001), “State Planning: A German Success Story?“, *International Planning Studies* 6(2), pp. 153-166, <http://dx.doi.org/10.1080/13563470125630>.
- LABO (Bund/Länder-Arbeitsgemeinschaft Bodenschutz) [Working Group on Soil Protection Issues of the German Federal States and the Federal Government] and LAWA (Bund/Länder-Arbeitsgemeinschaft Wasser) [Working Group on Water Issues of the German Federal States and the Federal Government] (2013), “Guidance for preparation of the baseline report on the state of soil and groundwater”, Umweltbundesamt [Federal Environment Agency], Dessau-Roßlau, Germany.
- Landeshauptstadt Düsseldorf Stadtplanungsamt [City of Düsseldorf Urban Planning Department] (2009), *Stadtentwicklungskonzept Düsseldorf 2020+, Wachstum fördern, Zukunft gestalten, Beiträge zur Stadtplanung und Stadtentwicklung in Düsseldorf* [City Development Concept 2020+, Promoting Growth, Shaping the Future, Contributions to Urban Planning and

- Development in Düsseldorf],  
[www.duesseldorf.de/planung/veroeffentlichungen/020\\_stek\\_kurz.pdf](http://www.duesseldorf.de/planung/veroeffentlichungen/020_stek_kurz.pdf).
- Landeshauptstadt Düsseldorf Stadtplanungsamt (2013a), *Stadtentwicklungskonzept Düsseldorf 2025+, Mehr Leben, Mehr Stadt, Für Alle, Stand Oktober 2013 (Entwurf)* [City Development Concept 2025+, More Living, More City, For All, as of October 2013 (Draft)].
- Landeshauptstadt Düsseldorf Stadtplanungsamt (2013b), *Zukunft Wohnen. Düsseldorf: Ein Handlungskonzept für den Wohnungsmarkt* [Future Housing. Düsseldorf: An Action Concept for the Housing Market],  
[www.duesseldorf.de/planung/stadtentw/handlungskonzept/pdf/zukunftwohnen.pdf](http://www.duesseldorf.de/planung/stadtentw/handlungskonzept/pdf/zukunftwohnen.pdf).
- Landeshauptstadt Düsseldorf Umweltamt [City of Düsseldorf Environment Department] (2013), “Auskunft aus dem Kataster der Altablagerungen und Altstandorte”,  
<https://formulare.duesseldorf.de/servlet/de.formsolutions.FillServlet?sid=9ZggDAhMJxkGKzFZ4FMVcjMjcC6tXJ2g&p=v.pdf>, last accessed February 3, 2015.
- Law, Steve (2015a, September 4), “City may devote more urban renewal money to affordable housing”, *The Portland Tribune*, <http://portlandtribune.com/pt/9-news/271751-147310-city-may-devote-more-urban-renewal-money-to-affordable-housing->.
- Law, Steve (2015b, September 14), “City exploring new taxes on demolition, developers to fund affordable housing”, *The Portland Tribune*, <http://portlandtribune.com/pt/9-news/272794-148357-city-exploring-new-taxes-on-demolition-developers-to-fund-affordable-housing->.
- Law, Steve (2015c, September 15), “Mayor Hales proposes \$25,000 tax on home demolitions”, *The Portland Tribune*, <http://portlandtribune.com/pt/9-news/273081-148928-mayor-hales-proposes-25000-tax-on-home-demolitions->.
- Leonard, H Jeffrey (1983), *Managing Oregon’s Growth: The Politics of Development Planning*, The Conservation Foundation, Washington, DC.
- Light, Matthew A (1999), “Different Ideas of the City: Origins of Metropolitan Land-Use Regimes in the United States, Germany, and Switzerland”, *The Yale Journal of International Law* 24, pp. 577-611.
- Maciag, Mike (2015), “Gentrification in America Report”, *Governing Magazine*,  
[www.governing.com/gov-data/census/gentrification-in-cities-governing-report.html](http://www.governing.com/gov-data/census/gentrification-in-cities-governing-report.html), last accessed May 12, 2015.
- Martinus, Kirsten (2012), “City Infrastructure Supporting Innovation”, *International Journal of Knowledge-Based Development* 3(2), <http://dx.doi.org/10.1504/IJKBD.2012.047033>.
- Mayer, Heike and John Provo (2004), “The Portland Edge in Context”, in Connie P Ozawa (Ed.), *The Portland Edge: Challenges and Successes in Growing Communities*, Island Press, Washington, DC, pp. 9–34.
- Mesh, Aaron (2015, June 10), “The 5 Myths About Portland Apartments”, *Willamette Week*,  
[www.wweek.com/portland/article-24870-the-5-myths-about-portland-apartments.html](http://www.wweek.com/portland/article-24870-the-5-myths-about-portland-apartments.html).
- Metro (n.d.), “Regional Framework Plan” [summary], [www.oregonmetro.gov/regional-framework-plan](http://www.oregonmetro.gov/regional-framework-plan), last accessed August 6, 2015.
- Metro (2011a), “Introduction”, in *Regional Framework Plan, 2011 Update*.  
[www.oregonmetro.gov/sites/default/files/01132011\\_regional\\_framework\\_plan\\_2011\\_update\\_table\\_of\\_contents\\_introduction\\_0.pdf](http://www.oregonmetro.gov/sites/default/files/01132011_regional_framework_plan_2011_update_table_of_contents_introduction_0.pdf), last accessed August 6, 2015.

- Metro (2011b), “Summary of 2040 Urban Growth Concept”, in *Regional Framework Plan, 2011 Update*,  
[www.oregonmetro.gov/sites/default/files/01132011\\_regional\\_framework\\_plan\\_2011\\_update\\_summary\\_of\\_2040\\_growth\\_concept.pdf](http://www.oregonmetro.gov/sites/default/files/01132011_regional_framework_plan_2011_update_summary_of_2040_growth_concept.pdf), last accessed August 18, 2015.
- Metro (2012), *Regional Brownfield Scoping Project, Final Report*, prepared by Maul Foster & Alongi, Inc., ECONorthwest and Redevelopment Economics, Portland, Oregon.
- Metro (2014a, May), *Portland Metropolitan Urban Growth Boundary Expansion History* [map],  
[www.oregonmetro.gov/sites/default/files/UGB\\_History.pdf](http://www.oregonmetro.gov/sites/default/files/UGB_History.pdf), last accessed August 6, 2015.
- Metro (2014b, September), *2014 Urban Growth Report, Revised Draft, September 2014*,  
[www.oregonmetro.gov/sites/default/files/2014-urban-growth-report-Revised-Draft-FINAL.pdf](http://www.oregonmetro.gov/sites/default/files/2014-urban-growth-report-Revised-Draft-FINAL.pdf).
- Metro (2014c, September 10), *Chapter 3.07, Urban Growth Management Functional Plan, Effective 09.10.14*,  
[www.oregonmetro.gov/sites/default/files/03.07%20Eff%2009102014%20%20Maps%20Title%204%20%206%20%2014%20amended%20maps%20effective%20102914%2020140910\\_1.pdf](http://www.oregonmetro.gov/sites/default/files/03.07%20Eff%2009102014%20%20Maps%20Title%204%20%206%20%2014%20amended%20maps%20effective%20102914%2020140910_1.pdf).
- Metro (2014d, December 4), *Resolution No. 14-4582, For the Purpose of Accepting the Draft Urban Growth Report as Support for Determination of Capacity of the Urban Growth Boundary*,  
[www.oregonmetro.gov/sites/default/files/UGR-Acceptance-SignedResolution-20141204.pdf](http://www.oregonmetro.gov/sites/default/files/UGR-Acceptance-SignedResolution-20141204.pdf).
- Metro (2015a), “Chapter 1: Land Use, Effective 3/18/15”, in *Regional Framework Plan*.  
[www.oregonmetro.gov/sites/default/files/Regional-Framework-Plan-Chapter1-LandUse-20150318-final%20%28MD-15-8552%29.pdf](http://www.oregonmetro.gov/sites/default/files/Regional-Framework-Plan-Chapter1-LandUse-20150318-final%20%28MD-15-8552%29.pdf), last accessed August 6, 2015.
- Metro (2015b, July), *2015 Urban Growth Management Decision: Recommendations to the Metro Council from Metro’s Chief Operating Officer, July 2015*,  
[www.oregonmetro.gov/sites/default/files/2015-GrowthManagement-COO-Recommendations-20150723.pdf](http://www.oregonmetro.gov/sites/default/files/2015-GrowthManagement-COO-Recommendations-20150723.pdf).
- MIK NRW (Ministerium für Inneres und Kommunales des Nordrhein-Westfalen) [North Rhine-Westphalia Ministry for Home Affairs and Municipalities] (2015a), *Geltende Gesetze und Verordnungen (SGV. NRW.) mit Stand vom 1.8.2015: Landesbodenschutzgesetz für das Land Nordrhein-Westfalen (Landesbodenschutzgesetz – LbodSchG* [Applicable Laws and Regulations (SGV. NRW.) as of August 1, 2015: State Soil Protection Act for the State of North Rhine-Westphalia],  
[https://recht.nrw.de/lmi/owa/br\\_bes\\_text?anw\\_nr=2&gld\\_nr=2&ugl\\_nr=2129&bes\\_id=4898&aufgehoben=N&menu=1&sg=0](https://recht.nrw.de/lmi/owa/br_bes_text?anw_nr=2&gld_nr=2&ugl_nr=2129&bes_id=4898&aufgehoben=N&menu=1&sg=0), last accessed August 11, 2015.
- MIK NRW (Ministerium für Inneres und Kommunales des Nordrhein-Westfalen) [North Rhine-Westphalia Ministry for Home Affairs and Municipalities] (2015b), *Geltende Gesetze und Verordnungen (SGV. NRW.) mit Stand vom 8.8.2015: Gesetz über die Erhebung eines Entgelts für die Entnahme von Wasser aus Gewässern (Wasserentnahmeentgeltgesetz des Landes Nordrhein-Westfalen - WasEG* [Applicable Laws and Regulations (SGV. NRW.) as of August 8, 2015: Act on the Levying of a Charge for the Abstraction of Water from Water Bodies (Water Abstraction Charges Law of the State of North Rhine-Westphalia – WasEG)],  
[https://recht.nrw.de/lmi/owa/br\\_text\\_anzeigen?v\\_id=10000000000000000191](https://recht.nrw.de/lmi/owa/br_text_anzeigen?v_id=10000000000000000191), last accessed August 12, 2015.
- MWEIMH (Ministerium für Wirtschaft, Energie, Industrie, Mittelstand und Handwerk des Landes Nordrhein-Westfalen) [North Rhine-Westphalia Ministry for Economy, Energy, Industry, Medium-Sized Businesses and Trade] (2014) *Operationelles Programm NRW 2014-2020 für den Europäischen Fonds für Regionale Entwicklung „Investitionen in Wachstum und Beschäftigung“ (OP EFRE NRW)* [North Rhine-Westphalia Operational Program 2014-2020 for the European Fund for Regional Development “Investment for Growth and Employment”],

- [www.efre.nrw.de/0\\_2\\_Aktuelles/00\\_Newsmedia/OP\\_Version\\_final\\_Internet\\_01.pdf](http://www.efre.nrw.de/0_2_Aktuelles/00_Newsmedia/OP_Version_final_Internet_01.pdf), last accessed March 3, 2015.
- MUNLV (Ministerium für Umwelt und Naturschutz, Landwirtschaft und Verbraucherschutz des Landes Nordrhein-Westfalen), AAV (Altlastensanierungs- und Altlastenaufbereitungsverband NRW), and (LUA NRW) Landesumweltamt Nordrhein-Westfalen [MUNLV (Ministry for Environment and Nature Conservation, Agriculture and Consumer Protection of North Rhine-Westphalia), AAV (North Rhine-Westphalia Contaminated Sites Remediation and Preparation Association), (LUA NRW) North Rhine-Westphalia State Environment Agency] (2004), *Altlastensanierung in Nordrhein-Westfalen* [Contaminated Sites Remediation in North Rhine-Westphalia], MUNLV, Düsseldorf, [www.lanuv.nrw.de/veroeffentlichungen/malbo/malborev/malborev04s001.pdf](http://www.lanuv.nrw.de/veroeffentlichungen/malbo/malborev/malborev04s001.pdf).
- NRW.INVEST (n.d.), “Düsseldorf Region”, [www.nrwinvest.com/NRW\\_at\\_a\\_glance/Economic\\_Regions\\_in\\_NRW/Duesseldorf\\_Region/index.php](http://www.nrwinvest.com/NRW_at_a_glance/Economic_Regions_in_NRW/Duesseldorf_Region/index.php), last accessed August 4, 2015
- NRWSPD – Bündnis 90/Die Grünen NRW [NRW Social Democratic Party – NRW Alliance 90/The Greens] (2012), *Koalitionsvertrag, 2012-2017* [Coalition Agreement, 2012-2017], [www.gruene-nrw.de/fileadmin/user\\_upload/gruene-nrw/politik-und-themen/12/koalitionsvertrag/Koalitionsvertrag\\_2012-2017.pdf](http://www.gruene-nrw.de/fileadmin/user_upload/gruene-nrw/politik-und-themen/12/koalitionsvertrag/Koalitionsvertrag_2012-2017.pdf), last accessed August 17, 2015.
- OECD (Organization for Economic Co-Operation and Development) (n.d.-a), *OECD Metropolitan Database*, <http://stats.oecd.org/Index.aspx?Datasetcode=CITIES>, last accessed July 27, 2015.
- OECD (n.d.-b), *OECD Regional Database*, [http://stats.oecd.org/Index.aspx?datasetcode=REG\\_DEMO\\_TL2](http://stats.oecd.org/Index.aspx?datasetcode=REG_DEMO_TL2), last accessed July 31, 2015.
- OECD (2003), *Environmental Risks and Insurance: A Comparative Analysis of the Role of Insurance in the Management of Environment-Related Risks*, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264105522-en>.
- OECD (2012), *Compact Cities Policies: A Comparative Assessment*, OECD Green Growth Studies, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264167865-en>.
- OHCHR (Office of the United Nations High Commissioner for Human Rights) (2013), “2013 Questionnaire for Governments, Study on Security of Tenure: Germany Response”, [www.ohchr.org/Documents/Issues/Housing/SecurityTenure/ResponseGermany.pdf](http://www.ohchr.org/Documents/Issues/Housing/SecurityTenure/ResponseGermany.pdf), last accessed August 11, 2015.
- Oliver, Lee, Uwe Ferber, Detlef Grimski, Kate Millar and Paul Nathanail, Paul (2005), “The Scale and Nature of European Brownfields”, [www.cabernet.org.uk/resourceefs/417.pdf](http://www.cabernet.org.uk/resourceefs/417.pdf), last accessed January 26, 2015.
- Or. Admin. R. 660-009-0020(5)* (2007), [http://arcweb.sos.state.or.us/pages/rules/oars\\_600/oar\\_660/660\\_009.html](http://arcweb.sos.state.or.us/pages/rules/oars_600/oar_660/660_009.html).
- Or. Admin. R. 660-024-0050(4)* (2009), [http://arcweb.sos.state.or.us/pages/rules/oars\\_600/oar\\_660/660\\_024.html](http://arcweb.sos.state.or.us/pages/rules/oars_600/oar_660/660_024.html).
- Oregon Brownfields Coalition (2015, February 12), “Brownfields: Polluted Sites, New Hope. 2015 Legislative Proposal: More Details”, exhibit of the Oregon House Committee on Revenue, May 13, 2015, <https://olis.leg.state.or.us/liz/2015R1/Downloads/CommitteeMeetingDocument/73292>.

- Oregon DEQ (Department of Environmental Quality) (n.d.-a), “Environmental Cleanup Site Information (ECSI), Frequently Asked Questions”, [www.deq.state.or.us/lq/ecsi/ecsiFAQ.htm](http://www.deq.state.or.us/lq/ecsi/ecsiFAQ.htm), last accessed April 7, 2015.
- Oregon DEQ (n.d.-b), “Leaking Underground Storage Tank (LUST) Cleanup Site Database” [webpage], [www.deq.state.or.us/lq/tanks/lust/LustPublicLookup.asp](http://www.deq.state.or.us/lq/tanks/lust/LustPublicLookup.asp), last accessed August 14, 2015.
- Oregon DEQ (2005-a, March 2), “Fact Sheet: Voluntary Cleanup Program Independent Cleanup Pathway”, in *Independent Cleanup Pathway Information Packet, Voluntary Cleanup Program*, [www.deq.state.or.us/lq/pubs/docs/cu/IndependentCUPathwayInfoPacket.pdf](http://www.deq.state.or.us/lq/pubs/docs/cu/IndependentCUPathwayInfoPacket.pdf), last accessed August 14, 2015.
- Oregon DEQ (2005-b, March 24), “Fact Sheet: Voluntary Cleanup Program”, in *Voluntary Cleanup Pathway Information Packet, Voluntary Cleanup Program*, [www.deq.state.or.us/lq/pubs/docs/cu/VoluntaryCUPathwayInfoPacket.pdf](http://www.deq.state.or.us/lq/pubs/docs/cu/VoluntaryCUPathwayInfoPacket.pdf), last accessed August 14, 2015.
- Oregon DEQ (2007), “Information About DEQ No Further Action Decisions”, [www.deq.state.or.us/lq/pubs/factsheets/cu/NoFurtherActionDecisions.pdf](http://www.deq.state.or.us/lq/pubs/factsheets/cu/NoFurtherActionDecisions.pdf), last accessed August 10, 2015.
- Oregon DEQ (2009, May), *UST Cleanup Manual: Cleanup Rules for Leaking Petroleum UST Systems, OAR 340-122-0205 through 340-122-0360 and Associated Guidance Documents*, Oregon DEQ, Portland, OR, [www.deq.state.or.us/lq/pubs/docs/tanks/USTCleanupManual.pdf](http://www.deq.state.or.us/lq/pubs/docs/tanks/USTCleanupManual.pdf), last accessed August 14, 2015.
- Oregon DEQ (2010), “Factsheet: Brownfields in Oregon”, Oregon DEQ, Portland, OR, [www.deq.state.or.us/lq/pubs/factsheets/cu/Brownfields.pdf](http://www.deq.state.or.us/lq/pubs/factsheets/cu/Brownfields.pdf).
- Oregon DEQ (2011), *Prospective Purchaser Program Guidance: Oregon’s Environmental Cleanup Law, ORS 465.327*, Oregon DEQ, Portland, OR, [www.deq.state.or.us/lq/pubs/docs/cu/GuidanceProspectivePurchaserProgram.pdf](http://www.deq.state.or.us/lq/pubs/docs/cu/GuidanceProspectivePurchaserProgram.pdf).
- Oregon DEQ (2015, June 1), *Environmental Cleanup Site Information (ECSI) Database*, Oregon DEQ, Portland, OR, [data provided to author by Gil Wistar, Oregon DEQ, June 1, 2015].
- Oregon DLCD (Department of Land Conservation and Development) (2010, March 12), *Oregon’s Statewide Planning Goals and Guidelines*, Oregon DLCD, Salem, OR, [www.oregon.gov/LCD/docs/goals/compilation\\_of\\_statewide\\_planning\\_goals.pdf](http://www.oregon.gov/LCD/docs/goals/compilation_of_statewide_planning_goals.pdf).
- Oregon DLCD (2014a, December 29), Agency Management Report, KPMs For Reporting Year 2014, Finalize Date: December 29, 2014, Oregon DLCD, Salem, OR, [www.oregon.gov/LCD/docs/budget/APPR\\_2014\\_Management\\_Comments.pdf](http://www.oregon.gov/LCD/docs/budget/APPR_2014_Management_Comments.pdf).
- Oregon DLCD (2014b, December 29), Annual Performance Progress Report (APPR) for Fiscal Year (2013-2014), Original Submission Date: November 5, 2014, Finalize Date: December 29, 2014, Oregon DLCD, Salem, OR, [www.oregon.gov/LCD/docs/budget/APPR\\_2014.pdf](http://www.oregon.gov/LCD/docs/budget/APPR_2014.pdf).
- Oregon Legislative Assembly (2015), *Enrolled House Bill 5030*, <https://olis.leg.state.or.us/liz/2015R1/Downloads/MeasureDocument/HB5030/Enrolled>.
- Oregon Legislative Committee Services (2014, September), “Background Brief on Environmental Cleanup”, Oregon Legislative Committee Services, Salem, OR, [www.oregonlegislature.gov/citizen\\_engagement/Reports/BB2014EnvironmentalCleanup.pdf](http://www.oregonlegislature.gov/citizen_engagement/Reports/BB2014EnvironmentalCleanup.pdf).
- Or. Rev. Stat. § 285A.185(1)* (2013), [www.oregonlegislature.gov/bills\\_laws/ors/ors285A.html](http://www.oregonlegislature.gov/bills_laws/ors/ors285A.html).

- Or. Rev. Stat.* § 465.255-.257 (2013), [www.oregonlegislature.gov/bills\\_laws/ors/ors465.html](http://www.oregonlegislature.gov/bills_laws/ors/ors465.html).
- Or. Rev. Stat.* § 465.315 (2013), [www.oregonlegislature.gov/bills\\_laws/ors/ors465.html](http://www.oregonlegislature.gov/bills_laws/ors/ors465.html).
- Or. Rev. Stat.* § 465.327 (2013), [www.oregonlegislature.gov/bills\\_laws/ors/ors465.html](http://www.oregonlegislature.gov/bills_laws/ors/ors465.html).
- Pahl-Weber, Elke and Dietrich Henckel (Eds.) (2008), *The Planning System and Planning Terms in Germany: A Glossary*, Akademie für Raumforschung und Landesplanung (ARL) [Academy for Spatial Research and Planning], Hannover, [http://shop.arl-net.de/media/direct/pdf/ssd/ssd\\_7.pdf](http://shop.arl-net.de/media/direct/pdf/ssd/ssd_7.pdf).
- PDC (Portland Development Commission) (n.d.), “North Macadam URA: Current Projects”, [www.pdc.us/our-work/urban-renewal-areas/north-macadam/current-projects.aspx](http://www.pdc.us/our-work/urban-renewal-areas/north-macadam/current-projects.aspx), last accessed August 17, 2015.
- PDC (2010), “Harbor ReDI Legislative Concept, v5.0, August 5, 2010” [Internal working document].
- Port of Portland, PDC (Portland Development Commission), City of Portland, and Metro (2004), *Brownfield/Greenfield Development Cost Comparison Study*, prepared by Group Mackenzie, Johnson Gardner, ERM, and Renova Partners, Portland, OR, [www.portofportland.com/PDFPOP/Trade\\_Trans\\_Studies\\_Brnfld\\_Stdy.pdf](http://www.portofportland.com/PDFPOP/Trade_Trans_Studies_Brnfld_Stdy.pdf).
- Portland City Council (2012, April 25), *Resolution No. 36918, As Amended, Adopt the Portland Plan as strategic plan to guide future City decisions (Resolution)*, Portland, OR, [www.portlandonline.com/portlandplan/index.cfm?c=58776&a=395538](http://www.portlandonline.com/portlandplan/index.cfm?c=58776&a=395538).
- Portland Housing Bureau (n.d.), “History of TIF Set Aside Policy”, Portland Housing Bureau, Portland, OR, [www.portlandoregon.gov/phb/article/428250](http://www.portlandoregon.gov/phb/article/428250), last accessed August 12, 2015.
- Portland Housing Bureau (2015), *State of Housing in Portland, Phase I, April 2015*, Portland Housing Bureau, Portland, OR, [www.portlandoregon.gov/phb/article/528253](http://www.portlandoregon.gov/phb/article/528253).
- PSU (Portland State University) Population Research Center (2015), *2014 Annual Population Report Tables, April 22, 2015*, PSU Population Research Center, Portland, OR, [www.pdx.edu/prc/sites/www.pdx.edu/prc/files/Oregon\\_Annual\\_Pop\\_Report\\_Tables\\_2014\\_v3.pdf](http://www.pdx.edu/prc/sites/www.pdx.edu/prc/files/Oregon_Annual_Pop_Report_Tables_2014_v3.pdf), last accessed July 30, 2015.
- Raumordnungsgesetz vom 22. Dezember 2008 (BGBl. I S. 2986), das zuletzt durch Artikel 9 des Gesetzes vom 31. Juli 2009 (BGBl. I S. 2585) geändert worden ist* [Federal Spatial Planning Act of December 22, 2008 (Federal Law Gazette I p. 2986), last amended by Article 9 of the Law from July 31, 2009 (Federal Law Gazette I p. 2585)] (2009), [www.gesetze-im-internet.de/bundesrecht/rog\\_2008/gesamt.pdf](http://www.gesetze-im-internet.de/bundesrecht/rog_2008/gesamt.pdf), last accessed March 16, 2015.
- Redden, Jim (2015, September 16), “Saltzman proposes renter protections after protest”, *The Portland Tribune*, <http://portlandtribune.com/pt/9-news/273188-149023-saltzman-proposes-renter-protections-after-protest>.
- Rehbinder, Eckard (2004), “A German source of inspiration? Locus standi and remediation duties under the Soil Protection Act, the Environmental Liability Act and the draft Environmental Code”, *Environmental Law Review* 6 (1), pp. 4-20, <http://dx.doi.org/10.1350/enlr.6.1.4.40877>.
- Scaturo, Michael (2015, June 23), “Germany’s toothless rent cap law won’t fix Britain’s housing crisis”, *The Guardian*, [www.theguardian.com/commentisfree/2015/jun/23/germany-rent-cap-britain-housing-crisis-uk-rental-reform-control](http://www.theguardian.com/commentisfree/2015/jun/23/germany-rent-cap-britain-housing-crisis-uk-rental-reform-control).
- Schiller, Georg, Andreas Blum, Robert Hecht, Gotthard Meinel, Holger Oertel, Uwe Ferber, and Eric Petermann (Eds.) (2013), *Innenentwicklungspotenziale in Deutschland. Ergebnisse einer bundesweiten Umfrage und Möglichkeiten einer automatisierten Abschätzung* [Internal development potentials in Germany. Results of a nationwide survey and possibilities of an

- automated assessment], Bundesinstitut für Bau-, Stadt- und Raumforschung [Federal Institute for Research on Building, Urban Affairs and Spatial Development], Bonn, [www.bbsr.bund.de/BBSR/DE/Veroeffentlichungen/Sonderveroeffentlichungen/2013/Innenentwicklungspotenziale\\_D.html](http://www.bbsr.bund.de/BBSR/DE/Veroeffentlichungen/Sonderveroeffentlichungen/2013/Innenentwicklungspotenziale_D.html).
- Schmidt, Brad (2015), “Portland nearly 1,500 units short of central city affordable housing goal”, *The Oregonian/OregonLive*, Portland, OR, [www.oregonlive.com/portland/index.ssf/2015/04/portland\\_nearly\\_1500\\_units\\_sho.html](http://www.oregonlive.com/portland/index.ssf/2015/04/portland_nearly_1500_units_sho.html).
- Schmidt, Stephan and Ralph Buehler (2007), “The Planning Process in the US and Germany: A Comparative Analysis”, *International Planning Studies* 12 (1), pp. 55-75.
- Schulze Baing, Andreas (2010), “Containing Urban Sprawl? Comparing Brownfield Reuse Policies in England and Germany”, *International Planning Studies* 15(1), pp. 25-35, <http://dx.doi.org/10.1080/13563471003736910>.
- Seltzer, Ethan Paul (2008), “Regional Planning and Local Governance: The Portland Story”, in Tetsuo Kidokoro, Noboru Harata, Leksono Probo Subanu, Johann Jessen, Alain Motte, and Ethan Paul Seltzer (Eds.), *Sustainable City Regions: Space, Place and Governance*, Springer, Tokyo, pp. 277–298.
- Staatskanzlei des Landes Nordrhein-Westfalen [State Chancellery of North Rhine Westphalia] (n.d.-a), “Erarbeitung eines neuen Landesentwicklungsplans für Nordrhein-Westfalen: Vergleich zwischen den bisher geplanten Festlegungen und den vorgesehenen Änderungen des LEP-Entwurfs” [Development of a New State Development Plan for North Rhine-Westphalia: Comparison Between the Previously Planned Specifications and the Planned Amendments to the Draft State Development Plan], Staatskanzlei des Landes Nordrhein-Westfalen, Düsseldorf, [https://land.nrw/sites/default/files/asset/document/vergleich\\_zwischen\\_den\\_bisher\\_geplanten\\_festlegungen\\_und\\_den\\_vorgesehenen\\_aenderungen\\_des\\_lep-entwurfs.pdf](https://land.nrw/sites/default/files/asset/document/vergleich_zwischen_den_bisher_geplanten_festlegungen_und_den_vorgesehenen_aenderungen_des_lep-entwurfs.pdf), last accessed August 17, 2015.
- Staatskanzlei des Landes Nordrhein-Westfalen (n.d.-b), “Landesregierung billigt Änderungen am Entwurf des Landesentwicklungsplans” [State Government Approves Amendments to the Draft National Development Plan], Staatskanzlei des Landes Nordrhein-Westfalen, Düsseldorf, <https://land.nrw/de/thema/landesplanung>, last accessed August 17, 2015.
- Staatskanzlei des Landes Nordrhein-Westfalen (2013), *Landesentwicklungsplan Nordrhein-Westfalen, Entwurf, Stand 25.6.2013* [North Rhine-Westphalia State Development Plan, Draft, as of June 25, 2013], Staatskanzlei des Landes Nordrhein-Westfalen, Düsseldorf, [https://land.nrw/sites/default/files/asset/document/lep\\_nrw\\_flieaytext\\_internet.pdf](https://land.nrw/sites/default/files/asset/document/lep_nrw_flieaytext_internet.pdf).
- Tang, Yu-Ting and C Paul Nathanail (2012), “Sticks and Stones: The Impact of the Definitions of Brownfield in Policies on Socio-Economic Sustainability”, *Sustainability* 2012(4), pp. 840-862, <http://dx.doi.org/10.3390/su4050840>.
- Thomas, Joachim (2011), “Uncontrolled Land Consumption Versus Resource-Saving Land Use in Germany”, *Land Tenure Journal* No. 1(2011), pp.79-99, [www.fao.org/nr/tenure/land-tenure-journal/index.php/LTJ/article/viewFile/19/60](http://www.fao.org/nr/tenure/land-tenure-journal/index.php/LTJ/article/viewFile/19/60).
- Thornton, Gareth, Martin Franz, David Edwards, Gernot Pahlen, and Paul Nathanail (2007), “The challenge of sustainability: incentives for brownfield regeneration in Europe”, *Environmental Science & Policy* 10(2), pp. 116-134, <http://dx.doi.org/10.1016/j.envsci.2006.08.008>.
- Tomerius, Stephan (2001), “Recycling Derelict Land in U.S. and German Cities – Transatlantic Sharing of Approaches, Strategies and Visions”, Report on a John J. Mc Cloy Fellowship with the American Council on Germany (ACG), Sep. 23rd to Oct. 21st, 2000, DIFU (Deutsches Institut für Urbanistik) [German Institute of Urban Affairs], Berlin, [www.difu.de/node/2856](http://www.difu.de/node/2856).

- Umweltbundesamt [German Federal Environment Agency] (2005), *The Future Lies on Brownfields*, Umweltbundesamt, Dessau, [www.umweltbundesamt.de/en/publikationen/future-lies-on-brownfields](http://www.umweltbundesamt.de/en/publikationen/future-lies-on-brownfields).
- US Census Bureau (2010), *State and County Quick Facts: Portland (city), Oregon*, <http://quickfacts.census.gov/qfd/states/41/4159000.html>, last accessed August 4, 2015.
- US EPA (Environmental Protection Agency) (1998, November), “Brownfields Showcase Community: Portland, OR”, <http://nepis.epa.gov/Exe/ZyPDF.cgi/P100BH3J.PDF?Dockey=P100BH3J.PDF>.
- US EPA (2009a, May), “Brownfields Cleanup Grant Fact Sheet, Portland Development Commission, OR”, [http://cfpub.epa.gov/bf\\_factsheets/gfs/index.cfm?event=factsheet.display&display\\_type=PDF&xpg\\_id=6995](http://cfpub.epa.gov/bf_factsheets/gfs/index.cfm?event=factsheet.display&display_type=PDF&xpg_id=6995).
- US EPA (2009b), “EPA R10 Brownfields Grant Site Eligibility Determination Outline”.
- US EPA (2011a, April 10), “Benefits of Brownfields Legislation”, last updated 4.10.2011, [www.epa.gov/brownfields/laws/2869ben.htm](http://www.epa.gov/brownfields/laws/2869ben.htm), last accessed August 5, 2015.
- US EPA (2011b, April 10), “Summary of the Small Business Liability Relief and Brownfields Revitalization Act”, last updated 4.10.2011, [www.epa.gov/brownfields/laws/2869sum.htm](http://www.epa.gov/brownfields/laws/2869sum.htm), last accessed August 5, 2015.
- US EPA (2012, April), “Brownfields At-A-Glance: Elizabeth Caruthers Park, Portland, OR, Cleanup Grant”, [www.epa.gov/brownfields/success/portland\\_or\\_caruthers\\_brag.pdf](http://www.epa.gov/brownfields/success/portland_or_caruthers_brag.pdf), last accessed August 17, 2015.
- US EPA, Office of Site Remediation Enforcement/Office of Enforcement and Compliance Assurance (2014), *The Revitalization Handbook, Revitalizing Contaminated Lands: Addressing Liability Concerns, June 2014*, <http://www2.epa.gov/sites/production/files/2014-06/documents/revitalization-handbook-2014-cleanup-enforcement.pdf>.
- US EPA and BMBF (German Federal Ministry of Education and Research) (2006, April 24-26), “Phase 4 Project Fact Sheets”, BMBF REFINA and U.S. EPA Practitioners Cooperation On Sustainable Revitalization workshop, Stuttgart, Germany, April 24-26, 2006, [www.bilateral-wg.org/ftp/US\\_Projects\\_Fact\\_Sheets.pdf](http://www.bilateral-wg.org/ftp/US_Projects_Fact_Sheets.pdf).
- US EPA and BMBF (2012, July 6), *United States and German Bilateral Working Group* [website], last updated July 6, 2012, [www.bilateral-wg.org](http://www.bilateral-wg.org).
- Wernstedt, Kris, Allen Blackman, Thomas P Lyon, and Kelly Novak (2010), “Voluntary Environmental Programs at Contaminated Properties: Perspectives from U.S. Regulators and Program Participants”, Discussion Paper, Resources for the Future: Washington, DC, [www.rff.org/files/sharepoint/WorkImages/Download/RFF-DP-10-18.pdf](http://www.rff.org/files/sharepoint/WorkImages/Download/RFF-DP-10-18.pdf).



## Appendix:

### Interview Contacts

- Arnz, Roland, AAV - Verband für Flächenrecycling und Altlastensanierung [Association for Site Recycling and Contaminated Site Remediation], June 23, 2015, Hattingen, Germany.
- Bieber, Andreas, Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit (BMUB) [Federal Ministry for Environment, Nature Conservation, Building and Nuclear Safety], April 27 2015, Bonn, Germany.
- Borth, Ulrika, Verband Region Stuttgart [Stuttgart Region Association], January 15, 2015 Stuttgart, Germany.
- Brockmeyer, Henk, Flächenpool NRW [North Rhine-Westphalia Land-Pool], May 18, 2015, Essen, Germany.
- Danielzyk, Rainer, (ARL) Akademie für Raumforschung und Landesplanung [Academy for Spatial Research and Planning], March 3, 2015, Dortmund, Germany.
- Darmendrail, Dominique, General Secretary, Common Forum on Contaminated Land, August 14, 2015, Paris, France.
- Derenthal, Ingrid, Landeshauptstadt Düsseldorf Umweltamt [City of Düsseldorf Environment Department], December 10, 2014 and January 13, 2015, Düsseldorf, Germany.
- Fritsch, Peter, Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit (BMUB) [Federal Ministry for Environment, Nature Conservation, Building and Nuclear Safety], July 15, 2015, Berlin, Germany.
- van Gemmeren, Christoph, Bezirksregierung Düsseldorf [Düsseldorf District Government], December 15, 2014, Düsseldorf, Germany.
- Grimski, Detlef, Umweltbundesamt (UBA) [Federal Environment Agency], July 13, 2015, Dessau-Roßlau, Germany.
- Herm, Thomas, Stadtplanungsamt Dresden [City of Dresden Urban Planning Department], April 10, 2015, Dresden, Germany.
- Hoof, Nannette, Ministerium für Klimaschutz, Umwelt, Landwirtschaft, Natur- und Verbraucherschutz des Landes NRW (MKULNV) [Ministry for Climate Protection, Environment, Agriculture, Conservation and Consumer Protection of the State of North Rhine-Westphalia], February 11, 2015, Düsseldorf, Germany.
- Jahnz, Barbara, Verband Region Stuttgart [Stuttgart Region Association], January 15, 2015, Stuttgart, Germany.
- König, William, Ministerium für Klimaschutz, Umwelt, Landwirtschaft, Natur- und Verbraucherschutz des Landes NRW (MKULNV) [Ministry for Climate Protection, Environment, Agriculture, Conservation and Consumer Protection of the State of North Rhine-Westphalia], February 11, 2015, Düsseldorf, Germany.
- Lehmann, Tim, Innovationszentrum für Mobilität und gesellschaftlichen Wandel (InnoZ) GmbH [Innovation Center for Mobility and Societal Change], December 2, 2014, via phone.
- Mathey, Juliane, Leibniz-Institut für ökologische Raumentwicklung (IÖR) [Leibniz Institute of Ecological Urban and Regional Development], April 10, 2015, Dresden, Germany.

Meier-Ewert, Birthe, Landeshauptstadt Düsseldorf Stadtplanungsamt [City of Düsseldorf Urban Planning Department], August 20, 2014, Düsseldorf, Germany.

Pahlen, Gernot, RAG Montan Immobilien GmbH [RAG Mining Real Estate], April 8, 2015 and June 22 2015, Bottrop, Germany.

Rößler, Stefanie, Leibniz-Institut für ökologische Raumentwicklung (IÖR) [Leibniz Institute of Ecological Urban and Regional Development], April 10, 2015, Dresden, Germany.

Schmid, Matthias, Landeshauptstadt Stuttgart Amt für Stadtplanung und Stadterneuerung [City of Stuttgart Urban Planning and Urban Renewal Department], January 16, 2015, Stuttgart, Germany.

Schwarze-Rodrian, Michael, Regionalverband Ruhr [Ruhr Regional Association], April 30, 2015, Essen, Germany.

Stangier, Andre, BEG NRW (BahnflächenEntwicklungsGesellschaft NRW mbH) [North Rhine-Westphalia Railroad Sites Development Agency], May 18, 2015, Essen, Germany.

Wiese-von-Ofen, Irene, former Deputy Mayor of Essen, January 6, 2015, Essen, Germany.

Wilder, Heinz, Geologischer Dienst Nordrhein-Westfalen [North Rhine-Westphalia Geological Survey], February 24, 2015, Krefeld, Germany.

**Additional Research Contacts:**

Armstrong, Tom, City of Portland Bureau of Planning and Sustainability, Portland, OR.

Bildersee, Jenn, City of Portland Bureau of Environmental Services, Portland, OR.

Bump, Tyler, City of Portland Bureau of Planning and Sustainability, Portland, OR.

Reed, Andy, Portland Development Commission, Portland, OR.

Wistar, Gil, Oregon Department of Environmental Quality, Portland, OR.