INFRASTRUCTURE TRANSITION ROADMAP

Leveraging adaptive reuse and infrastructure redevelopment for urban renewal

Extractive and manufacturing industries have profoundly shaped urban landscapes. In Europe and the US, industrialization resulted in the large-scale development of physical infrastructure. Factories, warehouses and offices were built together with roads, railway tracks and harbors. Residential buildings including employer-owned workers' housing settlements sprung up to accommodate rapidly growing urban populations.

Deindustrialization, in turn, led to the widespread decommissioning of mining sites and the closure of manufacturing plants, leaving urban centers with idle factory buildings and vast expanses of industrial wastelands. In 2011, Alliance cities Dortmund, Gelsenkirchen and Essen were still faced with 725, 460 and 290 hectares of brownfield sites within their administrative boundaries respectively.¹ The accompanying population loss additionally resulted in large quantities of abandoned buildings. Within the United States, the 2010 residential vacancy rates of Alliance cities Cincinnati and Buffalo still constituted 16.7% and 15.4% respectively compared to the national average of 11.4%.² European and US Alliance cities have thus targeted both disused industrial infrastructure as well as idle residential property as part of their urban renewal efforts.

While Chinese Alliance cities and districts have not been subject to the same processes of rapid industrialization and subsequent deindustrialization, they too have leveraged industrial infrastructure transitions as opportunities to transform their local economies to address pressing environmental issues such as air pollution.

As the three pathways illustrate, industrial legacy cities have a spectrum of options at their disposal to drive their infrastructure transitions. These range from strict industrial heritage conservation to complete demolition with various hybrid approaches in between. In addition, they can either be the ones directly financing and implementing these measures or those that enable other stakeholders to put them into practice. Thereby, they need to balance economic, environmental and social considerations and take into account the historical and cultural value of the physical infrastructure in question.

1. Berief, K. & Pankratz, E. (2012). Erhebungen über das Brachflächenrecycling in Nordrhein-Westfalen. Auftraggeber: Landesamt für Natur, Umwelt und Verbraucherschutz Nordrhein Westfalen. Retrieved from: https://www.lanuv.nrw.de/fileadmin/lanuv/boden/pdf/Endbericht20121109.pdf

2. Griffin, T.L., Yang, E., Flournoy, M. & Bartocci, J. (2015). Mapping America's Legacy Cities. J. Max Bond Center on Design for the Just City. Retrieved from: https://ssa.ccny.cuny.edu/wp-content/ uploads/2015/12/MappingAmericanLegacyCities_15Dec2015.pdf

PATHWAYS



SPEARHEADING INFRASTRUCTURE REUSE

Utilizing adaptive reuse to preserve industrial heritage and foster a shared identity



DRIVING INFRASTRUCTURE REDEVELOPMENT

Replacing outdated infrastructure to remake urban space and create a new identity



ENABLING INFRASTRUCTURE TRANSITIONS

Facilitating infrastructure conversions through city-led initiatives, matchmaking and financial incentives



SPEARHEADING INFRASTRUCTURE REUSE



Cities and districts in the Alliance have identified industrial infrastructure elements as key assets for urban renewal and development. There are several reasons that speak in favor of holding on to decommissioned colliery buildings, disused warehouses and former workers' settlements. From an environmental perspective, repurposing existing infrastructure is preferable to new construction due to the embodied energy and resources. Most importantly, industrial infrastructure elements lend character to a neighborhood and constitute important reminders of an industrial past and shared local identity.

In order to protect historically and culturally-significant industrial-era artifacts from demolition, local planning authorities can designate entire conservation areas or place selected features under preservation order. Both Alliance cities featured below took appropriate measures in this respect. Katowice included its whole Nikiszowiec district in the list of historical monuments. Gelsenkirchen preemptively put several infrastructure elements of its Consol mine under protection prior to the site's decommissioning.

When it comes to retaining industrial heritage buildings, adaptive reuse constitutes the most common choice. Adaptive reuse projects often still encompass the restoration of historic building envelopes and signature structures – particularly if mandated by heritage conservation requirements. In contrast to strict preservation approaches, however, it provides greater leeway for modifications and allows for an entirely new use plan. As such, industrial legacy cities can leverage adaptive reuse to retain buildings' historic value while simultaneously providing for current and future needs such as community space and cultural opportunities.

City of Gelsenkirchen: Consolidation 3/4/9 coal mine industrial complex



Gelsenkirchen's Bismarck district owes its origins to the rise of the coal industry. Opened in 1863, the Consolidation 3/4/9 coal mine industrial complex formed the center of economic activity of Bismarck for over 130 years. As a result, the district was heavily impacted by the coal mine's step-by-step decommissioning and subsequent population decline, unemployment and urban decay.

Revitalized Consolidation 3/4/9 coal mine industrial complex. © City of Gelsenkirchen, photo: Hubert Harst



To counteract the gradual degradation of the area, the City of Gelsenkirchen launched an urban renewal program for the two districts Bismarck and Schalke-Nord in 1995. The state-supported pilot program combined infrastructure and socio-cultural projects together with job creation measures. All activities were centrally coordinated by a newly-established district office and implemented in close coordination with the city's culture and urban planning departments, the private sector, local NGOs and other relevant actors.

The revitalization of the 27-hectare-large brownfield site of the former Consol mine was one of the flagship infrastructure projects. While much of the above-ground infrastructure was demolished following the mine's closure in 1993, several signature buildings and structures could be preserved as part of the project. The former fan house of mine shafts 3 and 4 was turned into the Consol-Theater and the winding engine house of mine shaft 4 was repurposed into a music rehearsal space with 39 sound-proof rooms. The 53-meter-high steel headframe and pit bank towering above mine shaft 9 were refurbished and the shaft's northern and southern winding engine buildings now house an art exhibition and an industrial heritage museum respectively. Job skills training and placement measures were an integral part of the reconstruction works, which were finalized between 2001 and 2006. In addition to the refurbishment of the colliery buildings, the adjacent 17 hectares of industrial land were remediated and rehabilitated. Since 2003 residents can access ConsolPark and its multitude of recreational amenities and green space.

Through the redevelopment and partial reuse of the Consolidation 3/4/9 brownfield site, the city-driven program was able to provide Bismarck with a new district center. The successful integrated and participatory urban renewal approach has since been replicated in other districts in Gelsenkirchen.

City of Katowice: Nikiszowiec district

Commissioned by the nearby Wieczorek (formerly Giesche) coal mine, Katowice's Nikiszowiec district presents a prime example of a miners' settlement of the early 20th century. Nikiszowiec was designed as a self-sufficient neighborhood: The district's signature red-brick buildings with inner courtyards provided housing for the workers and their families. This was complemented by a broad range of amenities and services such as a school, post office, church, cultural center and bath house. The coal mine acted as a patron and guardian of Nikiszowiec, taking care of infrastructure maintenance, providing health care, educational and community services and offering favorable lease agreements. In the mid-1990s, however, the coal mine came under increasing economic pressure. The resulting discontinuation of support to the housing estate led in turn to the gradual degradation of Nikiszowiec. Socio-economic problems started to emerge and the built environment began to deteriorate.

Recognizing the need for urban renewal, the City of Katowice included Nikiszowiec in its Local Revitalization Program and launched a variety of measures to revitalize the district. Most notably, Katowice implemented "The Heart of Nikiszowiec. Revitalization of the Historical Museum of Katowice building at Rymarska 4 street." between 2005-2007 and 2009-2010. The project converted the former laundry and mangle building into a mixed-use development. Situated at the market square of Nikiszowiec, the exterior shell of the city-owned building was preserved while gradually adapting its interior for alternative uses. It now houses a branch of the Museum of the History of Katowice, a tourist information center as well as a cultural center for the local community. Further city-led infrastructure measures included the refurbishment of Nikiszowiec's roads and market square and the provision of co-funding to one of the estate's housing associations to change the method of heat supply from coal-burning stoves to central heating. In addition to modernizing the built environment, numerous activities aimed at addressing social issues and strengthening community engagement were implemented as part of the Local Revitalization Program.



The city's efforts, supported by local actors and NGOs, were successful in transforming Nikiszowiec from a decaying neighborhood into a vibrant place to live and an attractive tourist destination.



DRIVING INFRASTRUCTURE REDEVELOPMENT

Many industrial legacy cities have been faced with an immense scale of industrial wasteland following their economic decline. Due to the sheer number and size of these brownfields, demolition and redevelopment are either used in conjunction with adaptive reuse or present often selected alternatives to it. When buildings and structures are beyond repair, too contaminated with hazardous substances or too specialized to allow for a different usage, demolition constitutes the only viable option to revitalize vacant and underutilized areas. Prior to any redevelopment, brownfields need to undergo an environmental site assessment to identify their levels of contamination and define the set of actions required to clean them. These are in part determined by their intended future land use. Areas designated for residential or green space redevelopment are subject to a higher level of remediation compared to conversions to industrial or commercial land uses.

Despite the efforts and costs associated with brownfield redevelopment, it constitutes an important urban renewal strategy for many industrial legacy cities, particularly where sites are centrally located. Alliance cities and districts have strategically replaced disused infrastructure and industrial wastelands to redevelop urban space and shape a new identity for their citizens as depicted by Dortmund's case example below. Further examples from the Alliance include E-Town's conversion of a former landfill site into a near-natural ecosystem and Buffalo's replacement of an old railway track with a recreational multi-use path.



Construction works as part of "The Heart of Nikiszowiec" project. © Katowice City Hall

City of Dortmund: PHOENIX West and PHOENIX Lake

At the turn of the 21st century the Phoenix blast furnace plant and steel works were decommissioned after nearly 160 years of industrial activity. The heavily contaminated industrial wasteland that was left behind to the east and west of the center of Dortmund's Hörde district encompassed a total area of 210 hectares. This presented the city administration with a major redevelopment challenge that it decided to turn into an opportunity for economic restructuring and urban renewal: The western site would be converted into a technology park while the eastern site would become a residential area with a lake.



In line with the administration's plans, the PHOENIX West project constituted the large-scale demolition of disused factory buildings and the construction of an industrial complex for future technologies. Selected industrial heritage buildings such as the blast furnace plant were retained, refurbished and brought to a new use. In contrast, the entire steel plant situated on the eastern site was disassembled and shipped to China. The resultant 98-hectare parcel of barren land was purchased by the City of Dortmund for the PHOENIX Lake project.

The key component of the large-scale project was the creation of a 24-hectare artificial lake. To this end, 2.5 million m³ of soil were dug out between 2006 and 2010. The heavily contaminated material was moved to PHOENIX West, while the soil that was only slightly polluted was used on-site to create an embankment for lakeside property and a 50-meter-high hill with a viewing platform. The remediated basin was subsequently flooded and opened to the public in 2011. Since then, various residential and commercial zones have been developed around the lake.

The implementation of the PHOENIX Lake project has been overseen by a development company, set up and fully-owned by the municipal utility. The company has been in charge of the entire development process as well as the re-financing of the project through the sale of property to private owners and investors. It has also organized regular roundtable meetings with citizens and local stakeholders to ensure buy-in for the conversion of the brownfield site.

PHOENIX Lake in 2014. © City of Dortmund, photo: Stefanie Kleemann

ENABLING INFRASTRUCTURE TRANSITIONS



It is evident that industrial legacy cities cannot implement their ambitious infrastructure transitions alone. Instead, they need to engage in strategic partnerships with national and regional governments, foundations and NGOs, the private sector as well as their citizens to overcome the lack of funding and capacity needed to transform their urban environment. As demonstrated by Alliance cities Gelsenkirchen and Dortmund, cities can set up dedicated management entities to effectively coordinate the multitude of different stakeholders involved in such large-scale, multi-year revitalization projects.



In addition, cities can act as key enablers rather than direct drivers of infrastructure transitions. The below examples from Alliance city Baltimore and Alliance district Huairou showcase some of the intermediary services, financial incentives and regulatory measures that cities can put in place to this end. For example, cities can provide prospective investors and home owners with valuable advice on legal frameworks, funding opportunities or potential strategic partners. Similarly, they can offer financial incentives in order to lower barriers to infrastructure conversions. These can either come in the form of grants and subsidies to increase access to capital or through tax breaks. Streamlining the enforcement of property code and putting favorable regulatory changes in place constitute further measures that cities can introduce to catalyze infrastructure transitions.

City of Baltimore: Vacants to Value program and Project C.O.R.E.

With close to one million inhabitants, Baltimore was one of the most populous cities in the United States in the mid-20th century thanks to its booming industrial economy. Deindustrialization and the associated decrease in factory jobs, however, resulted in a decline in population, rise in poverty and crime, and falling property values. This has led to an imbalance between supply and demand resulting in an extensive vacant and abandoned building stock scattered throughout Baltimore's neighborhoods. Repurposed Consol buildings. © City of Gelsenkirchen Rehabilitation works as part of the Vacants to Value program. © City of Baltimore Department of Housing & Community Development



Faced with almost 17,000 abandoned and blighted properties, the Baltimore City Department of Housing and Community Development launched the Vacants to Value (V2V) program in 2010 in an effort to spur urban renewal. The program aims to attract new residents and businesses, increase property values and boost municipal tax revenue by reducing the number of neglected properties. As part of the program, the city has strategically targeted neighborhoods that are distressed but possess market potential. Within these neighborhoods - designated as community development clusters the city has identified neglected privately-owned whole-block areas in need of rehabilitation and used code enforcement to mandate owners to fix their properties. If no action is being taken, ownership is ultimately auctioned off to developers that commit to renovating the properties within one year of purchase. In addition, the V2V program has streamlined the process of and accelerated the pace at which city-owned vacant properties can be transferred to developers. This has been complemented by a number of homeownership incentives. The V2V Booster Program, for example, offers prospective home buyers \$10,000 for the down payment and closing cost for the purchase of a formerly vacant, renovated house.

Recognizing that not every abandoned building can be rehabilitated, strategic demolition has constituted another key element of the city's strategy to revitalize neighborhoods. The city has funded the removal of over 1,700 buildings. To accelerate the strategic demolition of whole-block properties that are beyond repair, the city – in collaboration with the State of Maryland – launched Project C.O.R.E. (Creating Opportunities for Renewal and Enterprise) in 2016. The four-year program aims at converting blighted properties into green community spaces and new affordable and mixed-use housing.

Huairou District, City of Beijing: Facilitating adaptive reuse of factory buildings

Huairou District's burgeoning film industry has become a key hub for domestic film and television production. To accommodate the increased demand for film production space, the Huairou Film & Television Industry Park was officially announced in 2014. Spanning a total area of 18 km², the district's strategic plan for the Industry Park has foreseen the construction of a new site. In addition, it has focused on promoting the conversion of existing industrial building stock within the area for film industry purposes.

To this end, Huairou District first conducted a thorough analysis of the area concluding that there were over 2.4 km² of idle land and factory buildings with potential for conversion. In addition, the district carried out extensive research comprising interviews and surveys with factory owners to identify the key barriers to transition. These included legal difficulties in terms of adjusting land use rights and transferring property rights. A lack of technical guidance of how to adapt buildings to their new use cases as well as the high costs associated with the refurbishments presented further challenges.

In an effort to address these barriers, Huairou District has implemented various measures to facilitate and encourage adaptive reuse. After comprehensive evaluation, the district implemented a timely policy change relaxing regulations and stipulating appropriate land use adjustments. Huairou District provides assistance to support factory owners in familiarizing themselves with the legal frameworks and relevant policies. Furthermore, the district acts as a matchmaker between factory owners and interested investors. Matched collaborations between new investors and old factory owners can take forms such as joint ventures or pilot enterprises. To reduce the financial burden of infrastructure upgrades, Huairou launched a fund in 2016 through which owners could apply for up to 10 million RMB (approx. \$1.5 million) in subsidies towards the repurposing of idle properties. In 2018, another policy further secured rental and renovation subsidies specifically aimed at creative industries.

As a result of Huairou District's support measures, many under-utilized properties have gradually turned into unique assets for the film industry. These include creative campuses, broadcasting facilities and office space for post-production.



Huairou Film & Television Industry Park. © Shanshuihuairou

