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Shrinking Cities as European Capitals of Culture: Has this Status enabled their Reurbanisation?

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Shrinking Cities as European Capitals of Culture: Has this Status enabled their Reurbanisation?

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Abstract. More than 50 cities across Europe have been designed as the European capitals of culture for one year since the launch of this programme in 1985. Through organisation of different cultural events, this programme gives selected cities accessibility to generate significant cultural and socio-economic advantages, addressing their long-term regeneration and revitalisation and better competitiveness thereof. Several selected cities had gained this status during long-term urban shrinkage, the process where a population loss is caused by local socio-economic difficulties. Therefore, the supreme goal of such cities is certainly the reurbanisation based on better economic performance. The goal of the programme of European capital of culture -culture-led regeneration and revitalisation - perfectly fits with solutions for the economic problems of shrinking cities. The aim of this paper is to analyse has the status of European capital of culture has had an impact on population trends in the selected shrinking cities. Before the analysis, theoretical link between the concept of shrinking cities and urban regeneration and revitalisation is made. The selected cases are the shrinking cities with this status from 1985-2017, to preserve a 5-year threshold, adequate for the most recent demographic trends. The obtained results from the analysis show that the majority of the selected cities have entered reurbanisation after their year of the European capital of culture. Nevertheless, some of them have continued to shrink. The obtained results of the reurbanisation or prolonged shrinkage of the cities are further combined with the other characteristics of the selected cities, to fully understand their context. Comparing this, the paper conclusions target to indicate if and how the status of European capital of culture impacts on the local economy of a selected city though culture-led urban regeneration and revitalisation.

1. Introduction - Culture-led urban regeneration as a tool for shrinking cities

Urban shrinkage has become a new normality in urbanisation last decades, since the collapse of socialist system. This historic event has significantly increased the number of shrinking cities [1] [2].# At the beginning of third millennium, every fourth bigger city in the world was shrinking [3]. Furthermore, there are lot of examples which are considered as extreme due to fast and sudden shrinkage process. Apart of frequency, the phenomenon of urban shrinkage is complex, too. Many aspects of urban life and city functioning mutually overlap within it: economic, demographic, social, ecological, administrative, etc [4]. Some of them are more prominent and they define urban shrinkage. Shrinking cities are mainly recognised by demographic loss due to the problems of local urban economy [5]. This complexity of the phenomenon has certainly made a huge challenge to those who deal with urban shrinkage, regardless they belong to scientific circles of governmental structures. All aspects of urban shrinkage are further reflected in urban space, giving it a negative image to affected cities (Fig. 1).

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Figure 1: An abandoned and dilapidated industrial building in central Łódź, the former industrial hub of Poland (Source: B. Antonić); **Figure 2**: The artistic interpretation of urban shrinkage by "Shrinking Cities" Project (source: https://www.flickr.com/photos/fixbuffalo/616593762/).

The multifaceted character of urban shrinkage has opened many different ways how to deal with it. The reorientation from the research of the current state and ongoing statistics of shrinking cities to the possible development trajectories has happened in the early 2010s [6]. Two main development objectives prevail at local level: (1) a reurbanisation – a return to the situation before the shrinkage and, then, regrowth; and (2) the acceptance of current ('shrinking') situation, with the implementation of the measures to avoid the further decline [7]. G. Hospers [8] identifies two additional ways: (3) the intentional omitting to consider such situation as an urban shrinkage, i.e., as a (local) problem and (4) the utilisation of urban shrinkage as a 'playground' for innovative ideas and approaches.

Except the third way of the intentional trivialisation of the issue, all other trajectories include the measures of urban regeneration, albeit with the different goals and scales. Basically, there is a dichotomy between big- and small-format projects [9]. The first ones are usually the big-box flagship projects that are positioned as crucial for the wider redevelopment, with aspirations to rebrand the entire shrinking city [10]. They can vary greatly in functional aspect: zones for business incubators and start-ups, science parks, mixed-use waterfronts, cultural-creative quarters, exclusive housing districts or spectacle and sport arenas [11]. The nature of flagship projects prescribes them to be topdown urban projects, initiated, led or, at least, supported by urban or, even, national or regional governments. In the other side, there are small-scale projects in the form of small, locally initiated and led interventions, which sometimes can be grouped within bigger redevelopment strategies. Interestingly, the last-mentioned approach was used in the project that embraced the term urban shrinkage globally - "Shrinking cities / Schrumpfen Städte" (2002-2008). The small-scale events, exhibitions, experiments, and workshops (Fig. 2), done in joint collaboration between artists and scientists, were presented to local visitors, aiming to show that shrinking cities have their own milieu, identity, and uniqueness, which can be positively interpreted as an impulse for art and culture [12]. In its essence, this is the fourth way to deal with urban shrinkage by G. Hospers.

The explained example is a good starting point to highlight culture-led urban regeneration as an approach to redevelop shrinking cities, regardless its ultimate goal is reurbanisation or (just) economic and demographic stabilisation. Culture is considered to be a powerful force to shape urban future globally. It is emphasised through Sustainable Development Goals by the UN thereof. The promotion of local culture is positioned as a crucial target (No. 8.9) for economic growth. It is even more important for the goal 11 "Sustainable cities and communities", where it is pointed that cities are deeply characterised by culture, as its hubs, and which cultural heritage had to be safeguarded as a global target (No 11.4) [13]. Hence, the urban regeneration based on culture and cultural heritage can be globally as significant for (the economy of) vulnerable cities such shrinking ones.

Despite global goals, this type of urban regeneration for shrinking cities is not deeply stressed in relevant literature enough. It has been already observed that the quarters with the higher density and

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variety of cultural offer attract people and their settlement in these areas and, indirectly, reurbanisation [14]. The development of culture in this direction is not an easy task; it had to be a planned and strategically-driven process, respecting the ways to find and utilise the identity of shrinking cities [15]. In addition, culture-led urban regeneration cannot be implemented without a long-term perspective, where mix-use development and the right position of public facilities in urban matrix are crucial for wider regeneration [16]. Finally, it should be added that culture-led regeneration strategies cannot be successful in all cases [17].

The main idea behind this research is exactly to understand the potential and effects of culture-led urban regeneration for shrinking cities. It is done on the well-known institution of European Capital of Culture (ECC) as a showcase. This important European programme was launched in 1985 and more than 60 cities have been annually labelled by this status since that. Europe as a continent is also more than suitable for such investigation. The main concentration of shrinking cities globally is in Europe [1]. Cities in the eastern, post-socialist half of the continent have been particularly affected by shrinkage process; conversely, many former shrinking cities in its western half entered a reurbanisation last decades [18]. Interestingly, culture-led urban regeneration has been more exploited in its Western part [19], which is a discrepancy. Thus, the concrete aim of the research is to check has the status of European capital of culture had an impact on population growth/decline in the designed cities. The obtained findings of these demographic trends are further combined with the other main figures about the selected cities. Finally, the paper concludes how the status of European capital of culture is related to urban growth/shrinkage and, indirectly, how it impacts local economy though culture-led urban regeneration.

2. Methodology

In line with the approach based on the demographic trends in the selected cities – the former ECCs, this research is framed as a statistical analysis. It uses official statistical data from related population censuses to understand demographic trends in these cities. Theoretical part about the relations between urban shrinkage, culture-led urban regeneration and the essence of European capitals of culture essence is already given, to enable the better comprehension of the results exacted from the statistical analysis. Therefore, the final conclusions of the research aim not just to show how many ECC cities has been shrinking or growing during framed periods, but also to examine does this status impacts local prospects to halt shrinking patterns.

3. European capitals of culture and shrinking cities

The institution of European capital of culture (ECC) belongs to the well-established attainments of the EU. The process of urban regeneration makes a core in ECC aims. "Creative Europe" webpage, the respective page of the official website of the European Union, clarifies that the ECC status is created to, inter alia, "foster the contribution of culture to the development of cities" a basic goal, while the acquired experience has presented that it is "an excellent opportunity for regenerating cities". The paramount goals of ECC programme are, however, beyond European level, aspiring the international and global competiveness and visibility of designed cities. The first city with this title was Athens, the capital of Greece and the oldest capital city in Europe, in 1985. Since that, 60 cities across the continent have been granted by the status of European capital of culture for one year. Moreover, their relatively even distribution throughout the continent spatially reflects European togetherness. This has been especially noticeable in the last two decades (Fig. 3).

The sources that present direct relations between the challenges of shrinking cities and their (prospective) regeneration utilising the status of European capital of culture are extremely rare. Hence, they are worth to be mentioned. In the case of Glasgow, the ECC status has enabled the profound regeneration and reurbanisation of the previously shrinking city [19]. Similar conclusion was made for Liverpool, also in the United Kingdom, which "has experienced a renaissance in twenty-first century" after it was the ECC city in 2008 [20]. Nevertheless, this status for 2001 has not noticeably helped the

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City of Porto to redirect its shrinking development trajectory [21]. These three cities clearly underline that the ECC status has not worked in all cases.

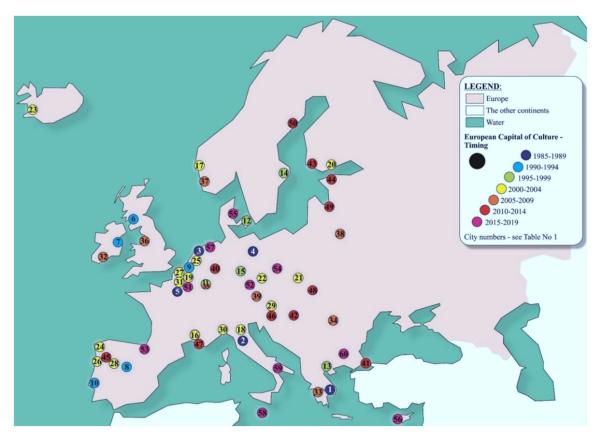


Figure 3: European capitals of culture – timeline and spatial distribution (Author: B. Antonić)

The last case is also illustrative. It is the unsuccessful bid of Görlitz in the eastern part of Germany for the status of European capital of culture. The City of Görlitz, notorious for long-term urban shrinkage, applied to be a ECC for 2010, hoping that this status would trigger by the overall regeneration of the city. However, the city was not selected for this status, which prompted local opponents to make arguments against the widespread thought that ECC status can bring just advantages. Some of them insisted that this status was generally "luxury" for the city in deep financial problems; the other opponents expressed their opinion that cultural development can be just "auxiliary" regarding local economy [22].

4. Research results – Shrinking cities as European capitals of culture

The inner analysis in this research is organised in line with internationally appreciated "Shrinking Cities International Research Network" (SCiRN). SCiRN defines shrinking cities as densely populated urban areas with at least 10,000 inhabitants and which have the population decline longer that two years and mainly caused by the problems in local economy. Demographic requirement (>10,000 inh.) is certainly fulfilled in the case of all ECC cities. Economic requirement is not in the focus of this analysis, but it indirectly matters; interrelations between different urban aspects was explained.

The other requirements for shrinking cities are more challenging for the analysis and they will be used with two settled limitations. First, peri-urban periphery with lower densities is excluded in the consideration of a part of urban areas. The other obstacle is the case of cities in conurbations, such as Porto and Guimarães in Great Porto Conurbation in Portugal, which both were ECC cities

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independently and in different years. Therefore, population trends in the administrative limits of ECC cities with high urban densities are analysed.

The other limitation is temporal. The selected cases are the cities with ECC status from 1985-2010, to preserve 10 years as the minimum interval between two official population censuses to acquire reliable statistical data for demographic trends.

For simpler analysis, the customised typology of shrinking cities is introduced:

- Type 1 Continuously growing cities, regardless their ECC status;
- Type 2 Shrinking cities before ECC year, reurbanisation after;
- Type 3 Shrinking cities before ECC year, the fluctuation of population after;
- Type 4 Growing cities before ECC year, urban shrinkage after;
- Type 5 Continuously shrinking cities, before and after ECC year.

Apart of the key demographic analysis, another demographic parameter is added – the size of the city within administrative borders. It is given in three options: below 0.5 million, 0.5-1 million, and more than 1 million. After all these steps, 42 former ECC cities are analysed in the table below:

Table 1. European capitals of culture 1985-2010 as shrinking or growing cities

| No City and ECC Year (ECC year is also marked as a "•" in timeline) | Population trends / growing (+), shrinking (-) (Source: official statistics presented at https://www.citypopulation.de/) | | | | Type | Size of city (2020) |
|--|--|-----------|-----------|-----------|------|---------------------|
| | 1980-1990 | 1990-2000 | 2000-2010 | 2010-2020 | | |
| 1. Athens (1985) | _ | _ | _ | _ | 5 | 0.5-1.0 |
| 2. Florence (1986) | | _ | + | + | 2 | < 0.5 |
| 3. Amsterdam (1987) | | + | + | + | 2 | 0.5-1.0 |
| 4. Berlin (1988) | + | _ | + | + | 2 | >1.0 |
| 5. Paris (1989) | | _ | + | _ | 3 | >1.0 |
| 6. Glasgow (1990) | | _ | + | + | 2 | 0.5-1.0 |
| 7. Dublin (1991) | _ | + | + | + | 2 | 0.5-1.0 |
| 8. Madrid (1992) | _ | + | + | + | 2 | >1.0 |
| 9. Antwerp (1993) | _ | _ | + | + | 2 | 0.5-1.0 |
| 10. Lisbon (1994) | _ | _ | _ | _ | 5 | 0.5-1.0 |
| 11. Luxembourg (1995) | _ | + + | + | + | 2 | < 0.5 |
| 12. Copenhagen (1996) | _ | | + | + | 2 | 0.5-1.0 |
| 13. Thessaloniki (1997) | _ | | _ | _ | 5 | < 0.5 |
| 14. Stockholm (1998) | + | + | + | + | 1 | 0.5-1.0 |
| 15. Weimar (1999) | _ | + | + | + | 2 | < 0.5 |
| 16. Avignon (2000) | _ | | + | + | 2 | < 0.5 |
| 17. Bergen (2000) | + | + | + | + | 1 | < 0.5 |
| 18. Bologna (2000) | _ | _ | + | + | 2 | < 0.5 |
| 19. Brussels (2000) | _ | _ | + | + | 2 | >1.0 |
| 20. Helsinki (2000) | + | + | + | + | 1 | 0.5-1.0 |
| 21. Krakow (2000) | + | + | _ | + | 3 | 0.5-1.0 |
| 22. Prague (2000) | + | - | + | + | 2 | >1.0 |
| 23. Reykjavik (2000) | + | + | + | + | 1 | < 0.5 |
| 24. Santiago Compostela (2000) | + | + | + | + | 1 | < 0.5 |

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| 25. Rotterdam (2001) | + | + | + | + | 1 | 0.5-1.0 |
|-----------------------|---|---|---|---|---|---------|
| 26. Porto (2001) | _ | _ | | _ | 5 | < 0.5 |
| 27. Bruges (2002) | _ | _ | + | + | 2 | < 0.5 |
| 28. Salamanca (2002) | _ | _ | | _ | 5 | < 0.5 |
| 29. Graz (2003) | _ | _ | + | + | 2 | < 0.5 |
| 30. Genoa (2004) | _ | _ | _ | _ | 5 | 0.5-1.0 |
| 31. Lille (2004) | + | + | + | + | 1 | 0.5-1.0 |
| 32. Cork (2005) | _ | _ | _ | + | 2 | < 0.5 |
| 33. Patras (2006) | + | + | + | _ | 4 | < 0.5 |
| 34. Sibiu (2007) | + | _ | _ | + | 2 | < 0.5 |
| 35. Luxembourg (2007) | _ | + | + | + | 2 | < 0.5 |
| 36. Liverpool (2008) | _ | _ | + | + | 2 | 0.5-1.0 |
| 37. Stavanger (2008) | + | + | + | + | 1 | < 0.5 |
| 38. Vilnius (2009) | + | _ | _ | + | 2 | 0.5-1.0 |
| 39. Linz (2009) | + | _ | + | + | 1 | < 0.5 |
| 40. Essen (2010) | _ | _ | _ | + | 2 | 0.5-1.0 |
| 41. Istanbul (2010) | + | + | + | + | 1 | >1.0 |
| 42. Pécs (2010) | + | _ | _ | _ | 5 | < 0.5 |
| | | | | _ | | |

COMMENTS: European capitals of Culture for the period 2010-2023 /// 2011 – Turku (43) and Tallin (44); 2012 – Guimarães (45) and Maribor (46); 2013 – Marseille (47) and Košice (48); 2014 – Riga (49) and Umeå (50); 2015 – Mons (51) and Plzeň (52); 2016 – San Sebastian (53) and Wrocław (54); 2017 – Aarhus (55) and Paphos (56); 2018 – Leeuwarden (57) and Valletta (58); 2019 – Matera (59) and Plovdiv (60); 2020/21 – Matera (61) and Plovdiv (62); 2022 – Kaunas (63), Esch-sur-Alzette (64) and Novi Sad (65); 2023 – Veszprem (66), Timișoara (67) and Eleusis (68).

5. Findings and conclusions

Reviewing the results obtained in the analysis, it seems that the one-year status of European capital of culture matters for the later urban regeneration of many labelled cities. This is the most prominent finding – almost half (20/48%) of the ECC cities have entered reurbanisation after their ECC year. Just one city (Patras in Greece) has witnessed a reverse development – from growing to shrinking. Finally, there are a plenty of cities (38%) which demographic trends have not been 'disturbed' by the ECC status – 7 such cities have continued to shrink and 9 of them to grow.

The mapping of five obtained types of the ECC cities by their population trends is more emblematic due to evident regional tendencies (Fig. 4). Almost all of continuously shrinking cities are located in Southern Europe, while the most continuously growing cities are in Northern Europe. This is not strange taking in account the Global economic crisis from 2008, which has especially shaken Southern-European countries, such as Greece and Spain. Then, the most of the ECC cities that transformed themselves from shrinking to reurbanised ones are in Western and Central Europe. These parts of Europe are cited as those where culture-led urban regeneration has been generally more exploited, which basically support the premise about the usefulness of the ECC status. The only inconclusive regional findings are for Eastern-European cities, more embedded with urban shrinkage. The analysed pool of such cities is very small for qualitative conclusions. However, it would very interesting to repeat the same analysis in ten years, because many cities in this region have had their ECC years recently.

The relation of the extracted types of ECC cities with the introduced parameter of the size of the ECC labelled cities is even blurrier. The city size is also a bit controversial issue in this analysis, because it excludes suburbia which is not administratively under a core city. In many cases of the ECC

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cities, their urban areas are more populated in suburbia then in core cities. Moreover, urban areas have been changing for decades, usually as an urban sprawl. This just complicates any analysis of demographic trends. However, an option for the analysis with the focus on core cities in their administrative limits can be useful to understand the relevance of demographic trends from the perspective of urban economy – more inhabitants within city limits means higher city budget.

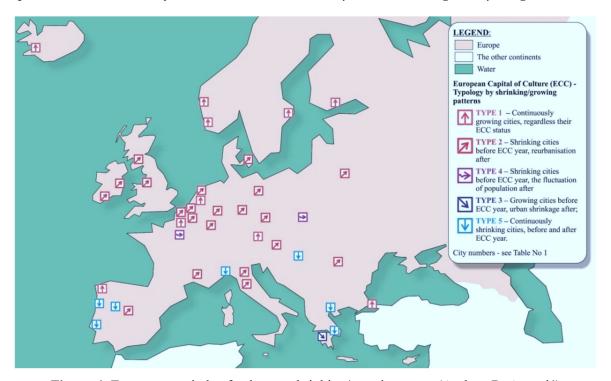


Figure 4: European capitals of culture – shrinking/growing types (Author: B. Antonić)

The last conclusion underlines the links between qualitative and quantitative analyses. The quantitative trends, such as population growth or decline, are not the only determinants of urban life, although they certainly matter. The qualitative change of urban life is also important [22]. This is probably the most striking topic for some future and wider research – to connect and overlap the qualitative and quantitative impacts of European capital of culture for the long-term urban regeneration of the designed cities and, in particular, for more vulnerable ones that face urban shrinkage as a big contemporary challenge.

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References

- [1] Haase A, Bernt M, Grossmann K, Mykhnenko V and Rink D 2016 Varieties of shrinkage in European cities *European Urban and Regional Studies* **23**(1) 86-102 doi.org/10.1177/0969776413481985
- [2] Szafrańska E, Coudroy de Lille L and Kazimierczak J 2019 Urban shrinkage and housing in a post-socialist city: relationship between the demographic evolution and housing development in Łódź, Poland *J. Housing and the Built Environment* **34**(2) 441-464. doi.org/10.1007/s10901-018-9633-2

doi:10.1088/1755-1315/1196/1/012095

- [3] Oswalt P and Rieniets T eds 2006 Atlas of Shrinking Cities (Ostfildern: Hatje Cantz Verlag)
- [4] Bernt M, Cocks M, Couch C, Grossmann K, Haase A and Rink D 2012 *Policy response, governance and future directions, shrink smart: Res. brief No. 2* (Leipzig: Helmholtz Centre for Environmental Research)
- [5] Richardson H and Woon Nam C eds 2014 *Shrinking cities: a global perspective* (London & New York: Routledge)
- [6] Djukić A, Antonić B and Vujičić T 2017 Urban shrinkage in a 'shrinking' Serbia The approach to a global phenomenon in a local context *Geodetski Vestnik* **61**(4) 614-629 doi.org/10.15292/geodetski-vestnik.2017.04.614-629
- [7] Rink D, Haase A, Bernt M, Großmann K., Bernt M, Couch C, Cocks M, Violante A, Cortese C and Calza Bini P 2011 *How shrinkage and local governance are interrelated across urban Europe: a comparative view* (Leipzig: Helmholtz Centre for Environmental Research)
- [8] Hospers G 2014 Policy responses to urban shrinkage: from growth thinking to civic engagement *European Planning Studies* **22**(7) 1507-1523 doi.org/10.1080/09654313.2013.793655.
- [9] Antonić B and Djukić A 2019 Dealing with shrinking cities through urban design *Int. Conf.:*Decoding Balkan: Architecture, Urbanism, Planning Proc. ed T Mrđenović (Belgrade: Faculty of Architecture) pp 84-89
- [10] Aber J 2009 The creative imperative in a postindustrial economy to foster a more sustainable development in shrinking cities. *The Future of Shrinking Cities* ed K Pallagst *et al* (Berkeley: University of California Press) pp 111-120
- [11] Smyth H 2005 Marketing the City: The role of flagship developments in urban regeneration (Sec. Ed.) (London: Taylor & Francis)
- [12] Hollander J, Pallagst K, Schwarz T and Popper F 2009 Planning shrinking cities. *Progress in Planning* **72**(4) 223-232
- [13] United Nations 2015 *About the sustainable development goals* (New York: UN) Retrieved from https://www.un.org/sustainabledevelopment/sustainable-development-goals/
- [14] Fol S and Cunningham-Sabot E 2010 « Déclin urbain » et shrinking cities: une évaluation critique des approches de la décroissance urbaine. *Annales de géographie* **674**(4) 359-383 doi:10.3917/ag.674.0359
- [15] Hwang K H 2014 Finding urban identity through culture-led urban regeneration *J. Urban Management* **3**(1-2) 67-85 <u>doi.org/10.1016/S2226-5856(18)30084-0</u>
- [16] Wang, Y and Fukuda H 2019 Sustainable urban regeneration for shrinking cities: a case from Japan Sustainability 11(5) 1505 doi.org/10.3390/su11051505
- [17] Keating M J and de Frantz M 2003 Culture-led strategies for urban regeneration: a comparative perspective on Bilbao. *International Journal of Iberian Studies*, 16(3), 187-194. doi.org/10.1386/ijis.16.3.187/1
- [18] Mykhnenko V and Turok I 2008 East European cities Patterns of growth and decline, 1960–2005. Int. Planning Studies 13(4) 311-342 doi.org/10.1080/13563470802518958
- [19] Cunningham-Sabot E and Roth H 2013 Growth paradigm against urban shrinkage: A standardized fight? The cases of Glasgow (UK) and Saint-Etienne (France). *Shrinking cities. International perspectives and policy implications* ed K Pallagst, T Wiechmann and C Martinez-Fernandez (London: Routledge) pp 99-124
- [20] Wagner F, Mahayni R and Piller A eds 2015 Transforming distressed global communities: making inclusive, safe, resilient and sustainable cities (Oxon & New York: Routledge) p 2
- [21] Sousa S and Pinho P 2012 Policies and strategies for dealing with demographic change/ shrinkage in Oporto (Portugal) *Demographic change and local development: shrinkage, regeneration and social dynamics* ed C Martinez-Fernandez, N Kubo, A Noya and T Weyman (Paris: OECD) chapter 8 pp 103-112
- [22] Kühn M and Liebmann H 2012 Urban regeneration strategies of shrinking cities in Eastern Germany *Die Erde* **143**(1-2) 135-152

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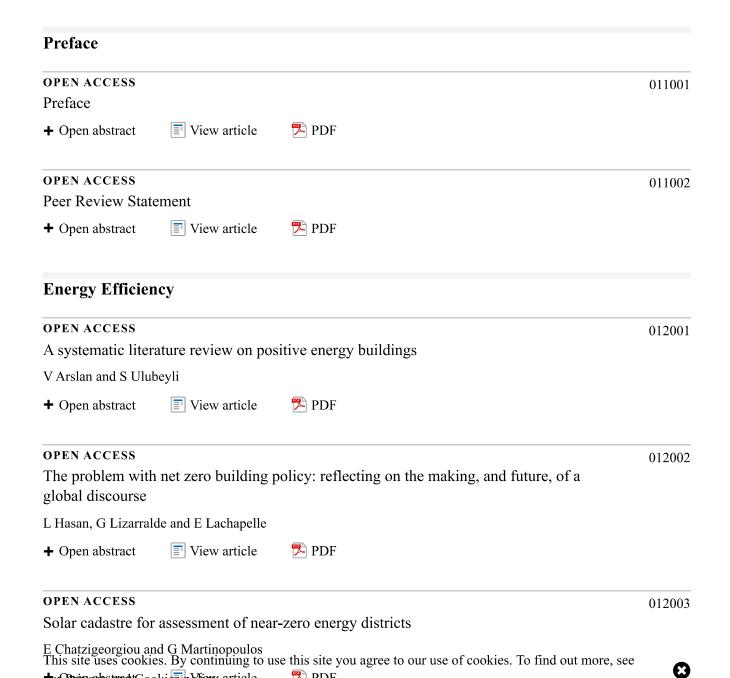
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