Brussels Studies
La revue scientifique électronique pour les recherches sur Bruxelles / Het elektronisch wetenschappelijk tijdschrift voor onderzoek over Brussel / The e-journal for academic research on Brussels
Collection générale | 2012

New RER stations for Brussels? Challenges, methods and constraints

Des nouvelles gares RER pour Bruxelles ? Enjeux, méthodes et contraintes

Nieuwe GEN-stations voor Brussel? Uitdagingen, methodes en beperkingen

Kevin Lebrun and Frédéric Dobruszkes

Translator: Jane Corrigan

Electronic version
URL: http://journals.openedition.org/brussels/1076
DOI: 10.4000/brussels.1076
ISSN: 2031-0293

Publisher
Université Saint-Louis Bruxelles

Electronic reference
Kevin Lebrun and Frédéric Dobruszkes, « New RER stations for Brussels? Challenges, methods and constraints », *Brussels Studies* [Online], General collection, no 56, Online since 16 January 2012, connection on 01 May 2019. URL : http://journals.openedition.org/brussels/1076 ; DOI : 10.4000/brussels.1076

BRUSSELS STUDIES
www.brusselsstudies.be
the e-journal for academic research on Brussels

Number 56, January 16th 2012. ISSN 2031-0293

Kevin Lebrun and Frédéric Dobruszkes

New RER stations for Brussels? Challenges, methods and constraints

Translation: Jane Corrigan

This article goes back over the debate which still remains to be settled and which divides the Brussels-Capital Region and the SNCB regarding the creation of new urban railway stations in the framework of the RER project. Our aim is to provide an objective (or at least methodologically transparent and clearly presented) assessment which is up to date as regards the relevance of these stations. Thus, after presenting the problem and discussing possible methods, we propose a calculation of the potential of each of the stations proposed by the different urban planning documents of the Brussels Region.
We thus illustrate the pertinence of most of them, a significant share of which are more relevant than some of the existing secondary stations in Brussels. However, the most promising stations are often those which seem the most difficult from a technical point of view. Conversely, new stations that would be the easiest to build often have the lower traffic potential.
Beyond the impartiality of the results, we also insist on the fact that the decision to put a station (back) into service depends above all on political action, which reflects the fact that challenges of various dimensions and natures have been taken into account. This is illustrated in our case studies.

Kevin Lebrun *has a master's degree in geography from Université Libre de Bruxelles, and wrote his thesis on new urban stations. He is currently working as a researcher at the Centre d'études sociologiques at Facultés universitaires Saint-Louis (Brussels), where he participates in the implementation of a mobility observatory for the Belgian capital.*

Frédéric Dobruszkes *has a doctorate in geography. He is currently a lecturer at Université Libre de Bruxelles (Faculty of Science, IGEAT) and a post-doctoral researcher at the Oxford University Transport Studies Unit. His research is focused on urban transport policy, the dynamics of air transport in Europe and high-speed train/aeroplane competition.*

Kevin Lebrun, +32 (0)2 211 79 30, kevin.lebrun@fusl.ac.be
Frédéric Dobruszkes, +44 (0)1865 285538, frederic.dobruszkes@ouce.ox.ac.uk

Christophe Mincke (Senior Editor), +32(0)2 211 78 22 / +32(0)473 21 02 65, mincke@fusl.ac.be

Brussels Studies is published thanks to the support of Innoviris (Brussels Institute for Research and Innovation - Brussels-Capital Region)

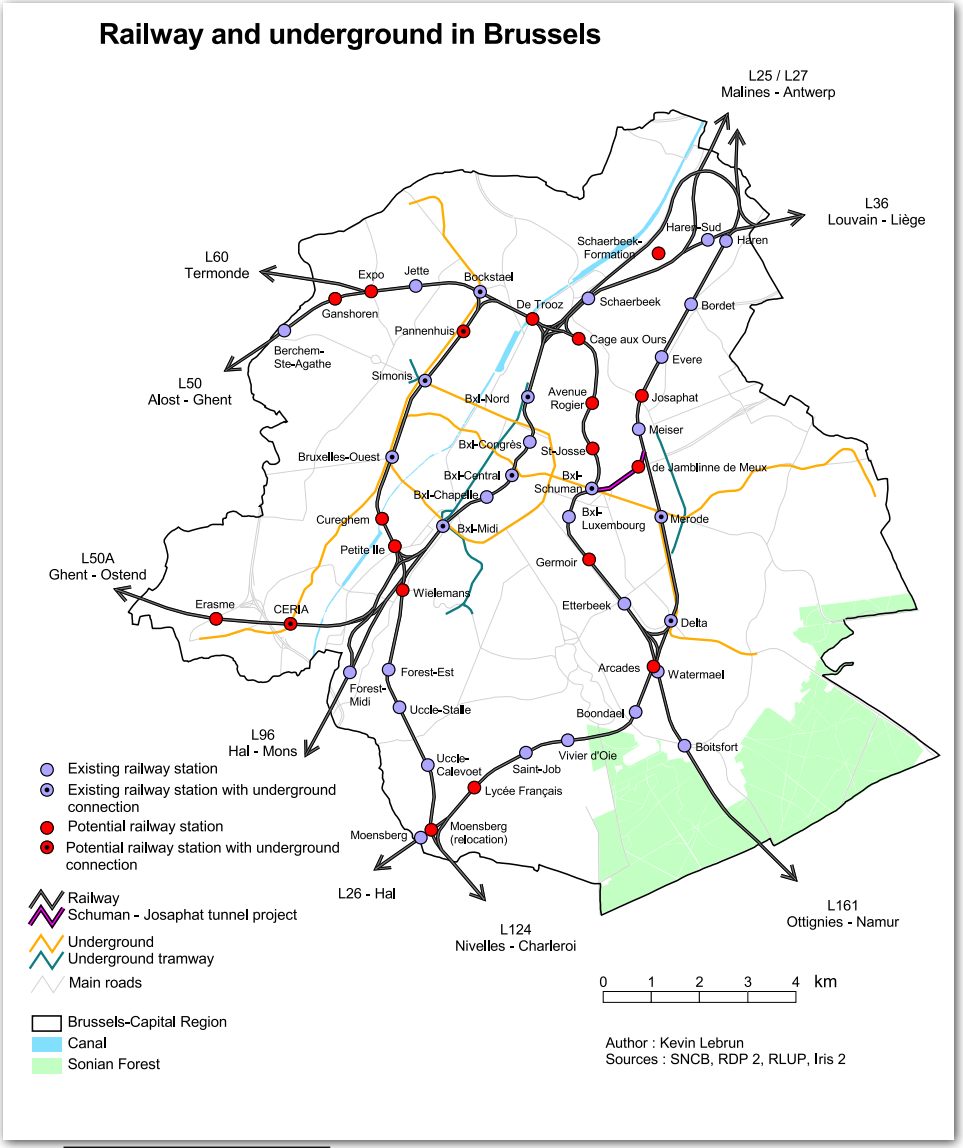


Figure 1. Existing railway and underground railway in Brussels

There are videos associated with this publication, which are inserted into the ePub version of the text, but can also be seen online (http://vimeo.com/channels/BruS)

1. Introduction

1.1 The potential role of the railway in an urban environment

1. It is well known that the Brussels metropolitan space is faced with increasingly serious mobility problems resulting from an over-use of private cars (Hubert et al., 2008; Courtois and Dobruszkes, 2008). Although road congestion is the most visible syndrome with the most media coverage, the most serious consequences are probably the resulting environmental impacts (in particular in terms of air pollution and noise) and the impact on the operating speed of surface mass transport. In this framework, the official objective of the public authorities is a 20% reduction in car traffic,[1] asserted by the second Regional Development Plan (or RDP 2, 'Plan régional de développement' (PRD) in French) and translated more concretely by the new Regional Mobility Plan (or Iris Plan 2). This type of objective inevitably raises two important questions: that of the modal choice and that of the absorptive capacity of mass transport in terms of additional passengers.

2. We know that modal choice today does not amount to the simple efficiency differential between the car and mass transport (Kaufmann, 2000 and 2008). However, the efficiency of the latter is still important for part of the public, if only to make a policy – which is no longer devoted essentially to car traffic – socially and politically acceptable. Fur-

[1] In vehicles/km with respect to 1999.

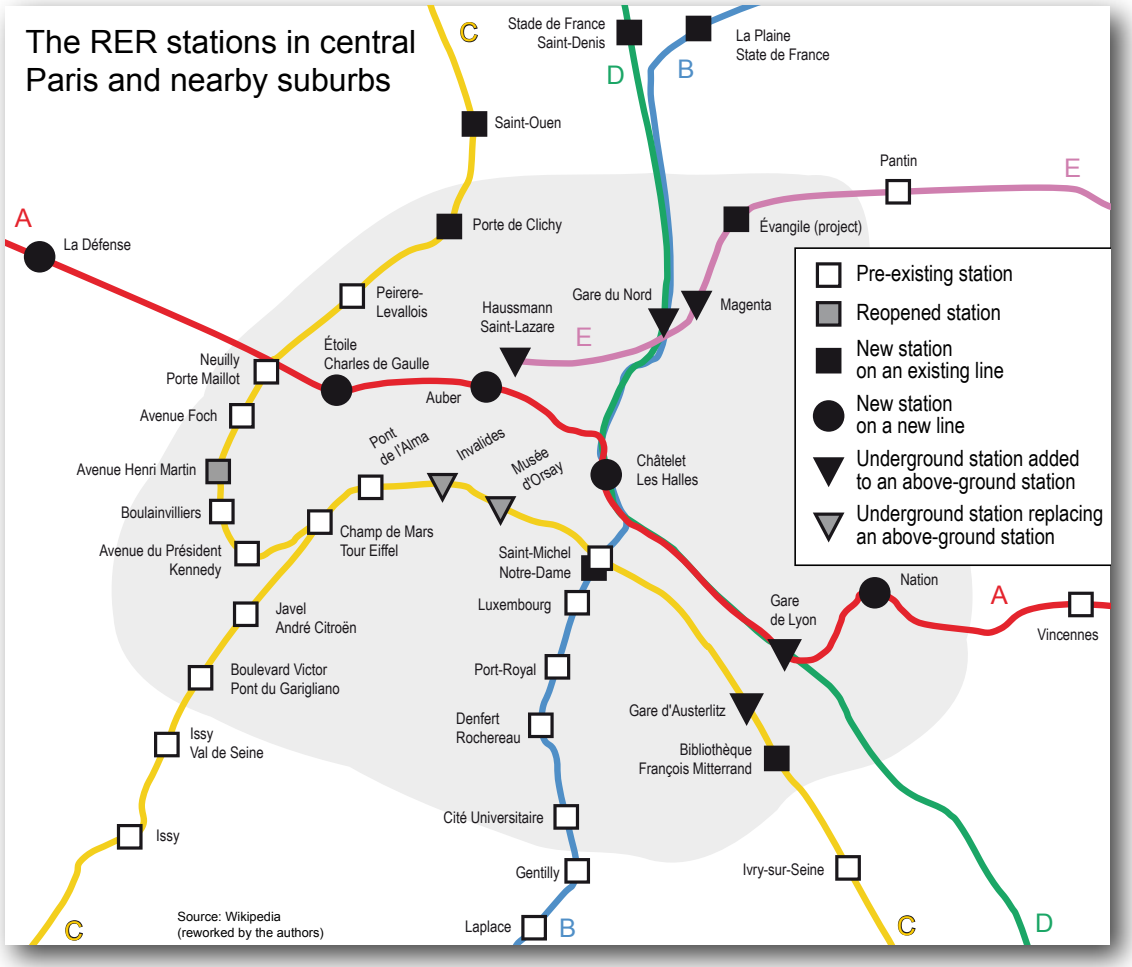


Figure 2. RER stations in Paris

thermore, the STIB[2] and its users are well aware that their network is faced with worrying capacity problems which have led to the purchase of bigger buses, trams and underground trains in order to solve the problem in the short term.

3. In this framework, we feel that the railway – in particular the future Regional Express Railway (RER) – plays a dual role. Firstly, through its efficiency (good operating speed combined with sufficient frequency), the RER has the potential to improve a network of underground trains and trams which are currently geographically limited and provide service to less than a third of the resident population, in a context of trams and buses which are often inefficient (Courtois and Dobruszkes, 2008) and the slow development of the underground railway network. Furthermore, in Brussels,[3] railway and underground railway are geographically complementary, with the former running north-south and the latter, east-west (figure 1), with 31 stations[4] in operation. Secondly, the implementation of the RER will correspond to an overall increase in mass transport provision, including in the Brussels urban space. This could therefore contribute to transporting more mass transport users.

4. While the future RER is often presented as a means of transport serving commuters from the suburbs, it also has a potential role to play as regards travel within the Brussels-Capital Region; the frequency of 4 to 6 trains per hour during rush hours for the small stations is compensated for by unbeatable travel time (for example Jette-Schuman in less than 10 minutes) and comfort, which is presumably better than that of mass urban transport.

[2]Société des Transports Intercommunaux de Bruxelles; the STIB is the operator of mass urban transport in the Belgian capital.

[3]Unless otherwise stated, Brussels refers to the Brussels-Capital Region.

[4]In a desire for simplicity, the term 'station' groups all of the terms used by the SNCB to designate the stops served by trains.

1.2 RER and new urban stations

5. The implementation of an RER-type network (or S-Bahn in the Germanic countries) has often been an occasion to consider the opportunity to create new stations in an urban environment, in addition to the rehabilitation of existing stations, in particular the small intermediate stations. Two dynamics are usually observed on the subject.

6. On the one hand, new stations are developed when new junctions crossing the central parts of the city are created. This is the case in Paris, for example, where the stations Nation, Châtelet Les Halles, Auber and Charles de Gaulle-Étoile were created from scratch in the urban area on the occasion of the interconnection of pre-existing lines located in the east and west suburbs (RER A) (figure 2). This was also the case with the *Passante ferroviario* in Milan, which connects the north-west and south-east suburban lines via the centre of the Italian economic capital (Margail, 1998). Along these 13 km, nine new stations were created (some of which are located under the old stations), five of which are close to the city centre.

7. On the other hand, new stations were also created along existing lines on the occasion of their conversion into an RER or as part of major urban projects. We can mention Paris once again in this respect (figure 2). Thus, the integration of the western part of the so-called 'Petite Ceinture' line into the RER C went hand in hand with the opening of a Porte de Clichy station and the reopening of the Avenue Henri Martin station, both located in the central area of Paris. The development of the new 'Rive Gauche' neighbourhood in southeast Paris on vacant railway land was accompanied by the creation of an RER station close to the François Mitterrand library. The major redevelopment project in another urban area in northeast Paris will be accompanied by the creation of 'Évangile' station in connection with a tram line under construction.

1.3 In Brussels: a technical/political conflict

8. Inspired by these European experiences, the Brussels regional authorities have demanded the reopening or creation of new urban stations located in the Brussels-Capital Region intended to improve the current network. The Region's different planning tools all proposed fifteen or so new railway stations, with variations from one document to the next (figure 3). However, the SNCB[5] opposed the proposal to build a large part of these new stations either due to technical constraints related to the capacity of lines,[6] or because it is worried about a rise in costs and the number of stations to the detriment of the operating speed (Frenay, 2009). Furthermore, the Brussels-Capital Region can only count on itself to defend 'its' stations. On the one hand, it cannot rely on the other regions or the federal state which supervises the SNCB. The two other Regions tend to defend direct or semi-direct connections with the main employment centres in Brussels (Frenay, 2009). On the other hand, it must face the municipalities, which do not necessarily play along with regional policy, with varying attitudes such as support, opposition or passivity (Misonne and Hubert, 2003). All of the ingredients are therefore brought together to cause a conflict of governance related to a metropolitan problem which goes beyond the strict framework of the Brussels-Capital Region: a conflict typical of cities where the administrative limits and the decision-making struc-

[5]We have used the acronym SNCB for all of the SNCB Group, i.e. Infrabel (in charge of infrastructures), the SNCB (which operates and markets the trains) and SNCB-Holding whose main purpose is to oversee the other two. From the outside, it is not always easy to know whether the opinions of the SNCB and Infrabel converge. Furthermore, part of the debate on the future stations took place at the time of the unitary SNCB, i.e. before 2005.

[6]In contrast with the examples presented in point 1.2, the stations proposed by the Brussels Region are partly located on sections of lines where RER and long-distance trains (more rapid) will be mixed.

tures hardly correspond to social and economic realities (Négrier, 2005; Subra, 2007). Consequently, in the current situation, the State/Regions/SNCB dialogue in the framework of the RER has led to plans for only eight additional stations,[7] according to the operational diagram of the so-called 'Article 13' study[8] (Significance et al., 2009).

9. The challenges are major in terms of mobility. Approximately 30% of residents of Brussels have direct access to the underground network, whereas approximately 20% live close to a railway station.[9] Therefore, if we do not consider the inhabitants who benefit from the two types of service close by (scarcely 7%), there are 43% of Brussels residents who benefit from an efficient mode of transport with a large capacity.

10. As a comparison, if all of the stations proposed by the region were put in service today, this percentage would rise according to our estimations to approximately 55%, and probably more by 2020 given the demographic trends within the region and the expected rise in value of certain sites potentially served by the RER (Tour et Taxis, Josaphat, etc.).

11. In this context, the objective of this article is to contribute to the debate, on the one hand by questioning the possible methods to evaluate the traffic potential of new stations, and on the other hand by applying the methodology proposed for the case of Brussels. The rest of this article is presented as follows: section 2 describes the state of the art for new RER stations in an urban environment; section 3 specifies the methods and data used; and section 4 presents their application. The article ends with conclusions.

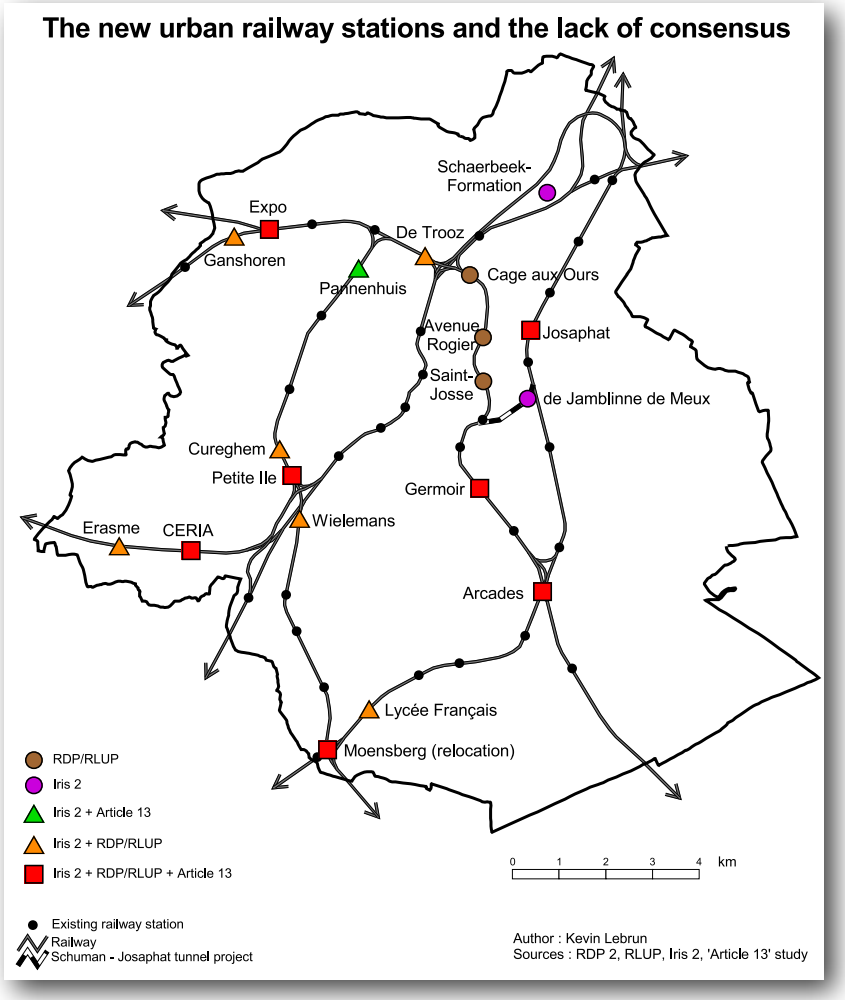


Figure 3. The new potential urban stations

[7]Excluding Vivier d'Oie, Bruxelles-Ouest and Simonis which were recently opened, and including Arcades and Germoir which are almost completed, as well as the relocation of Moensberg.

[8]Named in reference to article 13 of the law of 17/6/2005 regarding the implementation of the RER.

[9] Personal calculations taking into account travel on foot from home to the station of approximately 650m (underground railway and pre-underground railway) or 750m (train) at the most.

2. The new urban stations and the evaluation of their potential: state of the art and earlier studies

12. The research literature on the challenge of new urban railway stations and on the analysis of their relevance is limited in number to say the least, whereas relatively abundant literature exists on the spatial organisation of mass urban transport networks (see Guihaire and Hao, 2008). This is all the more true if we exclude the many articles which discuss high-speed rail (HSR) stations and their location (Facchinetti-Mannone and Bavoux, 2010).

13. Excluding the HSR, the literature related to the new stations concerns above all articles which propose methods of operational mathematics and the related algorithms allowing the optimal location of new stations to be established. Thus, Hamacher et al. (2001) propose a method to suggest the best locations for the creation of new stations on the existing lines, according to two requirements. On the one hand, this involves being as close as possible to the places of residence of the population and, on the other hand, having a positive result in terms of the gains and losses in time (gains for those who were not served and losses for the pre-existing passengers who have to endure more stations) with at least two kilometres between stations. The method is applied to all of Germany and the authors conclude that there is a need to perfect their double model. While the approach is mathematically complex, the variables and parameters considered are just as limited because, for example, the characteristics of the population, their destinations and the opportunities for connections between modes of transport are not considered. Laporte et al. (2002) propose a method to determine the location of stations on a new RER-type railway line whose route has already been decided. They try to optimise the number of stations and their location by balancing the population which would be potentially served and the travel time. They consider the complex question of the local space actually served by a potential station and its link with the spatial units of the population census. Like aforementioned authors, this article will not discuss the factors of opportunity of a potential station.

14. For the rest, the research literature focuses above all on the strategies of urban and regional development connected with the creation of a new station (for example Du, 2006, regarding the case of the new Guangzhou railway junction), the study of the optimal location for the new station in a given city (for example Mohajeri and Amin, 2010, for the city of Mashhad, Iran), the transport capacity of stations considering operating procedures and delays (see Yuan and Hansen, 2007) and their impact on the surrounding area (for example Debrezion et al., 2007, who analyse the influence of stations on nearby land value).

15. In this context, the studies related to the opportunity for new stations in an urban environment correspond to reports written by specialised consultants. They were made for use by the public authorities or transport companies, and normally were not intended to be made public. They are therefore not included in the debates of the academic community regarding methods, and sustain the public debate only indirectly and partially according to what the sponsor wishes to share with the public.

16. As regards the Brussels RER, let us mention two public contracts. On the one hand, the technical study which governed the elaboration of the second Regional Mobility Plan (Iris 2 Plan) was the occasion for the implementation of a global transport model. Different scenarios were simulated by including new RER stations. However, certain stations included in the RDP and the Regional Land Use Plan (RLUP)[10] have not been taken into account and vice versa (figure 3).

17. On the other hand, the Federal Public Service (FPS) Mobility and Transport financed a study centred specifically on 'potential users and the intermodality of RER stations' for the entire future network (Tritel and Aries, 2007). The approach which we propose in the following point is in keeping with the one presented by these authors, namely the estimation of a population basin rather than the establishment of a traffic model. Certain differences however – in particular regarding the list of stations analysed – justify the present research.

[10] 'Plan régional d'affectation du sol' (PRAS) in French.

3. Analysis of the potential of new urban stations: methods and data

18. The potential of a new station may basically be evaluated in two ways: a method which may be qualified as difficult, and an easier method which we have implemented.

3.1 The difficult method: the establishment of a transport model

19. The 'difficult' method consists in implementing a transport model covering at least the metropolitan space concerned. This type of model is composed of several 'layers' (Merlin, 1991). First of all, it is necessary to have a matrix of origins and destinations on a relatively detailed scale, followed by a model of modal choice distributing travellers between the different modes of transport according to different parameters (at least the compared efficiency and the sociological, demographic and economic characteristics of the population). Once the distribution of passengers has taken place, it is necessary to have a model of itineraries assigning them to different possible routes according to probability rules.[11] Once this fabric has been woven according to the real situation observed in the field, modifications of the service may be simulated, such as the opening of a new station in the case which interests us here.[12]

20. While this method appears to be quite serious and rigorous and allows an easy comparison of different scenarios, it nevertheless presents a certain number of problems and limitations. First of all, the travel demand is not well known. The traditional population and housing censuses take only regular travel into account (home-work and home-school), whose relative significance tends to decrease progressively (Benoît and Benoît, 1995; Orfeuil, 2008). This type of traffic corresponds only to travel which takes place mainly during rush hours. Furthermore, this information is often not available until several years after the census. The alternative consists in carrying out household surveys, which allow a wider travel spectrum to be covered in terms of motives and temporalities (Hubert and Toint, 2002). However, these surveys involve a sampling of the population which limits the possibility of working on a detailed geographic scale. Failing that, gravity models are sometimes used to generate the flow of people, which creates serious problems in terms of reliability, considering the influence of population characteristics and the poles of attraction (Dobruszkes and Marissal, 2002). Furthermore, modal choice is a complex social process, bringing many parameters into play which are not necessarily easy to quantify and must be adjusted according to the different components of society and the different motives (De Witte et al., 2011). Finally, we are very far from the rationality presupposed by the models. Some people suggest that global transport models may be valid on a zonal or regional scale but not on the scale of a station in the network: errors may therefore be too significant if there are not marked changes in the service (Chu, 2004). Furthermore, it is difficult for these models to detect the induction of a new demand due to the presence of inhabitants who decide to travel more as a result of an improved transport service.

21. In this context, a traffic model covering a large and diversified space such as Brussels can only be developed in the framework of considerable human and therefore financial means. This is why this type of mission is usually entrusted to private consultancy firms or university research departments at distant intervals. Often the model itself and the basic data are not public and are therefore not able to be reused by third parties. And above all, the question still remains as to the coverage of a large enough traffic spectrum in terms of motives and temporalities.

3.2 An easier method: the estimation of potential traffic

22. Consequently, a second way of estimating the relevance of new urban stations involves a more 'home-made' approach by calculating *potential* traffic, or a population basin. This means identifying the people who may be led to use a station. Of course, the potential indicates nothing about the expected use of stations to the extent that we must

[11] Or to a single route for the most basic models.

[12] For more in-depth discussions on different methods and the types of model which can be used, see Preston (1991), Chu (2004), Blainey and Preston (2010) and Gutiérrez et al. (2011).

also consider traffic, modal choice and itineraries. However, it allows an easy classification of the potential stations while going beyond the rigid framework of traditional regular rush hour traffic. This is the approach taken by some researchers or consultants, such as Gutiérrez et al. (2011) in the case of the underground railway in Madrid, or Tritel and Aries (2007) and ourselves in the case of stations in Brussels.

23. The estimation of potential involves an examination of the factors which contribute to the use of a station. We have identified three groups of variables which correspond respectively with the three main functions of a station:

- its use by nearby residents (the station as the neighbourhood's point of exit);
- its use by people who do not live in the neighbourhood but who go there to work, to use different facilities, etc. (the station as the neighbourhood's point of entry);
- its use in connection with the other mass transport networks or individual transport ('park and ride' and 'bike and ride').

24. Table 1 provides details of the indicators used for each of these potential uses. Whenever possible, we have combined elements of 'stock' (number of inhabitants, surface area of offices, frequency of mass transport, etc.) and characterisation (households without cars and type of mass transport in connection with the RER in order to distinguish underground railway, tram and bus, which each have a different appeal [Ministry of the Brussels-Capital Region, 2003]). These indicators have been calculated for the space of 530 metres surrounding the existing and potential stations.[13] The spaces covered by the area of attraction of several stations have been distributed among these in order to avoid counting them twice. According to the case, the data are limited to block or so-called 'statistical sector'.

25. As with the abovementioned study by Tritel and Aries, we also consider the station as the point of entry and exit of the neighbourhood served, while combining quantitative and qualitative data on the population and employment. The works differ however with respect to a few points. The range of variables used, and therefore the spectrum of potential travel, is larger here. However, our areas of influence of stations refer to a binary logic of pedestrian proximity (the surrounding area is or is not integrated in the basin of a station), while the abovementioned study considers multimodal accessibility estimated according to generalised cost functions translated by a spatialised gradient of the area of influence. Our station basins are therefore geographically more compact than those in the study by Tritel and Aries, which is however partially compensated by our third group of variables illustrating opportunities for connections between mass transport networks. Finally, our research does not consider three stations which were put (back) into service after this study (Brussels-Ouest, Simonis and Vivier d'Oie), but considers three others which have (re)appeared more recently in the regional urban planning arsenal (de Jamblinne de Meux, Pannenhuis and Petite Île). The potential station of Schaerbeek-Formation was not taken into account due to a lack of precise location on this vast site.

26. Let us also mention that our research focuses on the potential stations within the Brussels-Capital Region, in the framework of differences in perspective between them and the SNCB as mentioned at the beginning of this article.

27. However, the two studies did not consider the fact that the multiplication of urban stations might reduce the appeal of the RER for passengers coming from Flanders or Wallonia, due to less appealing travel time. The measurement of this type of impact normally only falls within the scope of a global traffic model. We feel, however, that this problem should not be overestimated. On the one hand, the RER trains will have powerful acceleration and breaking capacities which may limit or even fully compensate for the additional time required by the multiplication of stations. On the other hand, other scenarios may be considered, whereby not all trains stop at each station. Furthermore, while the new stations create an ease of access to major urban areas, they might also

[13]Based on an orthogonal grid of roads / roads plan and in accordance with the Pythagorean theorem, this represents a walking distance of maximum 750 m, or approximately 10 minutes of walking.

The station as	Indicators	Data used	Source of data
the neighbourhood's point of exit	Total population of the neighbourhood of the station	Population per statistical sector	National Register, 2006
	Number of households without a car	Means of transport of households per statistical sector	INS-ESE, 2001
the neighbourhood's point of entry	Office space in the neighbourhood	Surface area of offices per block	MRBC-AATL, Observatoire des Bureaux, 2008
	Presence of specific facilities	Address of various types of school	French Community, 2010
			ULB student thesis, 2004
		Address of hospitals	Brussels-Capital Region, 2010
			Belgian Hospital Association, 2010
		Location of commercial centres	ULB-IGEAT, 2004
point of interconnection with mass transport	Frequency and connectivity of the RER	Number of RER calling at the station	'Article 13' study, 2009
		Number of stations connected to the station studied	
	Frequency and modal distribution of other urban public transports	Number of services calling at the station	STIB document of frequency, 2010
		Share of the different modes of transport (underground railway, tram, bus)	STIB networks map, 2010

Table 1. Indicators used to estimate the potential of new urban stations

increase the appeal of the RER for Flemish and Walloon commuters. Finally, the frequency of RERs will in all likelihood be a factor of appeal at least as important as travel time, since it has a strong impact on the actual door to door travel time.

28. The question therefore arises as to the global evaluation of each station. For this purpose we opted for two simple and transparent rating methods (for more details, see Lebrun, 2010).

29. For each of the 18 potential stations, a first method gives a rating of 0 to 5 for each indicator. We then add up these ratings to obtain the overall score per station, therefore giving us the absolute potential.

30. A second method is based on a comparison of each indicator used for the potential stations with the same indicator for 19 existing small stations in Brussels as a reference. This is done in order not to use a reference which is influenced too much by the big stations (Brussels-Midi, Brussels-Central, etc.) or the medium-sized stations (Schaerbeek, Etterbeek, etc.). The score for each station is therefore the sum of the differences with respect to the reference stations for each of the indicators used. It therefore gives us their relative potential.

31. The absolute potential method allows a comparison of the potential stations among themselves only. The relative potential method has the advantage of assessing the relevance of potential stations with respect to stations of more or less the same size currently in service and therefore implicitly considered as legitimate or useful to the community.[14]

32. In both cases, we have ensured that the same weight was given to the three functions identified (entries/exits/connections), which therefore each account for one third of the scores obtained.

33. Finally, we therefore propose a simple method, which undoubtedly has limits (does not take into account the impact on passengers of existing stations, impossible to simulate different scenarios, etc.) but which seems to be rational, transparent and relatively easy to imple-

[14] It could be asserted that the existing stations are hardly justified since they are a historical legacy from the 19th century. However, the SNCB's successive 'rationalisation' plans have already led to the closing of stations which were considered the least 'profitable' (Charlier and De Schutter, 2002; Dessouroux, 2008).

ment compared with the establishment of a traffic model whose apparent precision might be misleading (table 2). It was used for two different time frames:

- the current situation;
- horizon 2025, based on hypotheses related to the increase in value of land reserve (areas of regional interest in the RLUP), the development of the mass urban transport network (based on the Vision 2020 document written by the STIB[15]) and personal suggestions for local improvements as regards station access and connections with the nearby buses and trams.

	Traffic model	Estimation of the potential
Implementation	Difficult and costly	Relatively easy and not very costly
Travel motives and temporalities covered	Model often implemented for regular travel during rush hour	More diversified
Transparency	Limited	High
Consideration of the impact of new stations on pre-existing passengers	Yes	No
Result obtained	Estimation of use for the period covered (passengers/hour)	Rating, comparison
Simulation of network and operational variations	Possible	Impossible

Tableau 2. Comparaison des méthodes

4. Results

4.1 Current rating of potential stations

34. Table 3 presents the rating of potential stations considering the criteria used for the current situation while confronting it with a basic estimation of their technical feasibility.[16] We notice first of all that the two methods –namely, the absolute one and the relative one– used lead to quite similar results. The second method, however, provides a greater range of figures: it therefore gives more details of the result. The rating method is, however, comparable.

35. Next, we notice the wide range of scores obtained. The stations clearly do not have the same potential according to the criteria used. It must, however, be mentioned that the great majority of stations proposed (10 out of 18) have a higher potential than that of a small, existing station in Brussels (figures higher than '1' in the third column). The first four even have figures more than twice as high as this level.

36. Finally, the last piece of information is that among the stations with the highest ratings are unfortunately those which are the most difficult to build. As a legacy of former centuries, the configuration of sites (layout of railway lines, density of urbanisation, technical networks, etc.) can make it impossible to set up new stations without major expropriations. Even where urban stations have already existed, such as Chaussée de Louvain in Saint-Josse, space is often too limited today to put them back into service. Operational requirements have evolved. On the one hand, regional trains have become longer; on the other hand, the density and diversity of railway traffic generally require the doubling of lines when building stations, in order to separate the trains which make stops from through trains.

37. Conversely, the urban stations which are easiest to create are also often the least worthwhile as regards potential traffic, since they are located in open and/or post-industrial neighbourhoods.

[15]The new Regional Mobility Plan (Iris Plan 2), whose great merit is that it was approved by the regional government and therefore has an official character, was not yet available when we were carrying out our study.

[16]Estimated through field visits and an analysis of high-resolution aerial photos. In strict logic, in-depth technical analyses should clarify this first approximation.

Station	Current score (2010)		Variables whose value is higher than the median of secondary stations in Brussels		Technical feasibility	Score in 2025 Relative method*
	Absolute method	Relative method*	Number (max 6)	Nature of variables		
Cage aux Ours	16	2.48	5	Population, households without a car, offices, schools, interconnection (tram/bus)	– –	2.97
Germoir	14	2.40	5	Population, households without a car, offices, schools, hospitals	+ +	2.40
Pannenhuis	15	2.27	5	Population, households without a car, offices, schools, interconnection (underground railway/bus)	+ +	2.78
Saint-Josse	12	2.12	3	Population, households without a car, offices	– –	2.12
de Jamblinne de Meux	12	1.98	5	Population, households without a car, offices, schools, interconnection (bus)	– –	1.98
Wielemans	12	1.57	4	Population, households without a car, offices, interconnection (tram/bus)	– –	1.80
Arcades-Watermael**	10	1.23	3	Population, households without a car, interconnection (RER/bus)	+ +	1.25
Cureghem	10	1.20	3	Population, households without a car, interconnection (tram/bus)	+	1.20
Avenue Rogier	7	1.20	2	Population, households without a car	–	1.92
CERIA	8	1.10	2	Offices, schools	+	2.03
Erasme	4	0.82	2	Offices, hospitals (relative proximity)	+ +	0.98
Ganshoren	5	0.75	2	Population, households without a car	+	0.75
Josaphat	6	0.68	0	None (area to be developed)	+ +	2.38
De Trooz	6	0.68	2	Offices, schools (relatively isolated station)	– –	0.68
Petite Île	5	0.55	1	Households without a car (relatively isolated station: few inhabitants, few jobs, almost no connection possibilities)	+	0.55
Expo	4	0.53	1	Hospitals (relatively isolated station)	–	0.75
Moensberg (relocation)	5	0.53	1	Interconnection (station essentially useful for connections between RER lines)	+ +	0.60
Lycée Français	2	0.13	0	None (isolated station)	+	0.17

Table 3. The potential of new RER stations in Brussels
** The value '1' corresponds to the potential median of a secondary station in Brussels.*
*** Arcades and Watermael were considered as a single station, as they are adjacent and therefore provide service to the same neighbourhood.*

38. Among the stations with great potential and good technical feasibility, there are two which are being developed and will be put into service in the coming years (Germoir and Arcades-Watermael). The station CERIA will be developed in the framework of works planned for the short term. Among the stations with a high potential which are technically easy to build are above all the Pannenhuis and Cureghem stations, which once existed. Let us mention, however, that part of the appeal of the potential Pannenhuis station is due to the connection with the underground railway, which already exists at Simonis station where the number of directions is even higher. For the other stations, the interest seems to depend on the evolution of the local context (see following section) or the consideration of various challenges which will be discussed below.

4.2 Horizon 2025

39. The application of the same method for horizon 2025 does not drastically change the observations made for the existing situation, except for some potential stations (Table 3, last column). The opportunity for two stations is in particular greatly improved by the expected developments. The first is Josaphat station, located on the site with the same name, where there are major urbanisation plans in the form of housing and offices. The second is CERIA station, to the extent that the automation of lines 1 and 5 (east-west line) of the Brussels underground railway should lead to a sharp increase in frequency, and therefore to a greater appeal of the RER/underground railway connection.

40. A large number of the other potential stations will also become more important by 2025, although in a less spectacular manner. The station on Avenue Rogier would benefit if, as we suggest, the tram and bus stops are brought closer together. The Pannenhuis station would become more useful with the creation of a new tram line to serve the rehabilitated Tour et Taxis site. The relevance of the Cage aux Ours station would be reinforced by the plausible passage of the future underground railway line serving Schaerbeek and Evere. The potential station on Avenue de l'Exposition Universelle would have a slightly higher score thanks to the rapid tram line serving UZ Brussel without necessarily raising itself very high in the rating. Finally, the Wielemans station would

Station	Present research (horizon 2025)	Study by Tritel and Aries (horizon 2015)
Cage aux Ours	1	5
Germoir	2	1
Josaphat	3	12
Saint-Josse	4	7
CERIA	5	6
Avenue Rogier	6	8
Wielemans	7	2
Arcades-Watermael	8	4
Cureghem	9	3
Erasme	10	15
Ganshoren	11	9
Expo	12	11
De Trooz	13	10
Moensberg (relocation)	14	13
Lycée Français	15	14

Table 4: comparison of results with the study by Tritel and Aries (2007) according to decreasing rankings of potential
For the study by Tritel and Aries, we considered the scenario 'with parking restrictions' which involves de facto access on foot or by mass transport for the stations in Brussels (annexe 5.3A of the study).

become more relevant due to potential real estate projects in the immediate surroundings.

41. Finally, a comparison of our results with those of the abovementioned study by Tritel and Aries in the form of rankings for the stations included in both works, shows quite marked convergences (table 4). The differences are due above all to different hypotheses regarding future real estate developments in the areas of regional development (Josaphat, Wielemans). Furthermore, the study by Tritel and Aries estimates basins of use which are more subtly influenced by the mass urban transport service, possibly leading to bigger areas of influence or, on the contrary, to more limited ones in the case of competition with another relatively close and easily accessible station (this would explain the lower rating for Cage aux Ours, which in all likelihood competes with the North station on the edge of the basin).

42. In conclusion, we observe that – already in 2010 – most of the planned stations have the same potential as the group of 'small' stations in Brussels which they are compared with here. Furthermore, some of these stations have a high margin of progression of their potential. If we add the aspect of technical feasibility, the results tend to distinguish a small group of stations which are very promising and relatively easy to build (Arcades, Germoir, CERIA and Cureghem in the short term, and Josaphat and Pannenhuis in the longer term) from a series of others which, at first glance, should not prevail should an order of priority be established.

43. Furthermore, we notice that the urbanisation and/or densification in the areas around potential stations, as well as the development or optimisation of mass urban transport, are major challenges as regards the justification of certain stations proposed by the Brussels-Capital Region. Regional policy and transport policy indeed appear to be closely linked.

4.3 Case studies

44. Beyond the results which have just been presented, local constraints, various challenges and political objectives should be considered. The development and operation of a new station is a complex decision which should not be reduced to the results of estimations made by transport experts. The following examples are aimed at explaining this.

4.3.1 The weight of local constraints: Cage aux Ours

45. Located on a 5.5 km stretch with no intermediate station between the North Station and Schuman, the potential Cage aux Ours[17] station is the most promising of all, at present as well as for horizon 2025. It is located in a densely populated neighbourhood, with a mostly non-motorised population and many possibilities for connections with STIB trams and buses and, in all likelihood, with the future underground railway line in the northeast of the capital in the longer term.

46. However, this station is also one of the most difficult to build as regards constraints related to railway operation and the urbanistic context (figure 4). Given the density of railway traffic and the mix of RER and through trains, a new station in this location would inevitably require a doubling of lines in order to separate the trains which stop there from the others. A doubling of lines between Schuman and the North Station would be costly and complex and is not on the agenda. Such an option was not chosen for the major reconstruction of the Schuman station which began recently. Another option would be to add two railway lines to a limited part of the line, between the possible Cage aux Ours station and the north-south junction. In addition to the delicate railway operation, such a development is almost impossible due to a lack of space with respect to the existing built-up area. Furthermore, the doubling of lines at Place Verboekhoven does not seem possible as there is not enough space under the bridges used by the tram lines. The trams could encounter slope-related problems if the space were to be cleared out and recreated. Lowering the level of railway lines is hardly possible as well, due to the presence of a large number of

[17] Although it is not an official place name, for many the Cage aux Ours corresponds to Place Eugène Verboekhoven.

wastewater collectors. Finally, the development of a station only seems possible in the framework of the two existing railway lines, which is unthinkable given the density of railway traffic.

47. This example is symbolic of the difficulties encountered when there are plans to modernise a railway infrastructure which has existed for a long time and is caught in a dense urbanisation process, in the framework of an intense railway operation combining urban, regional, national and international traffic.

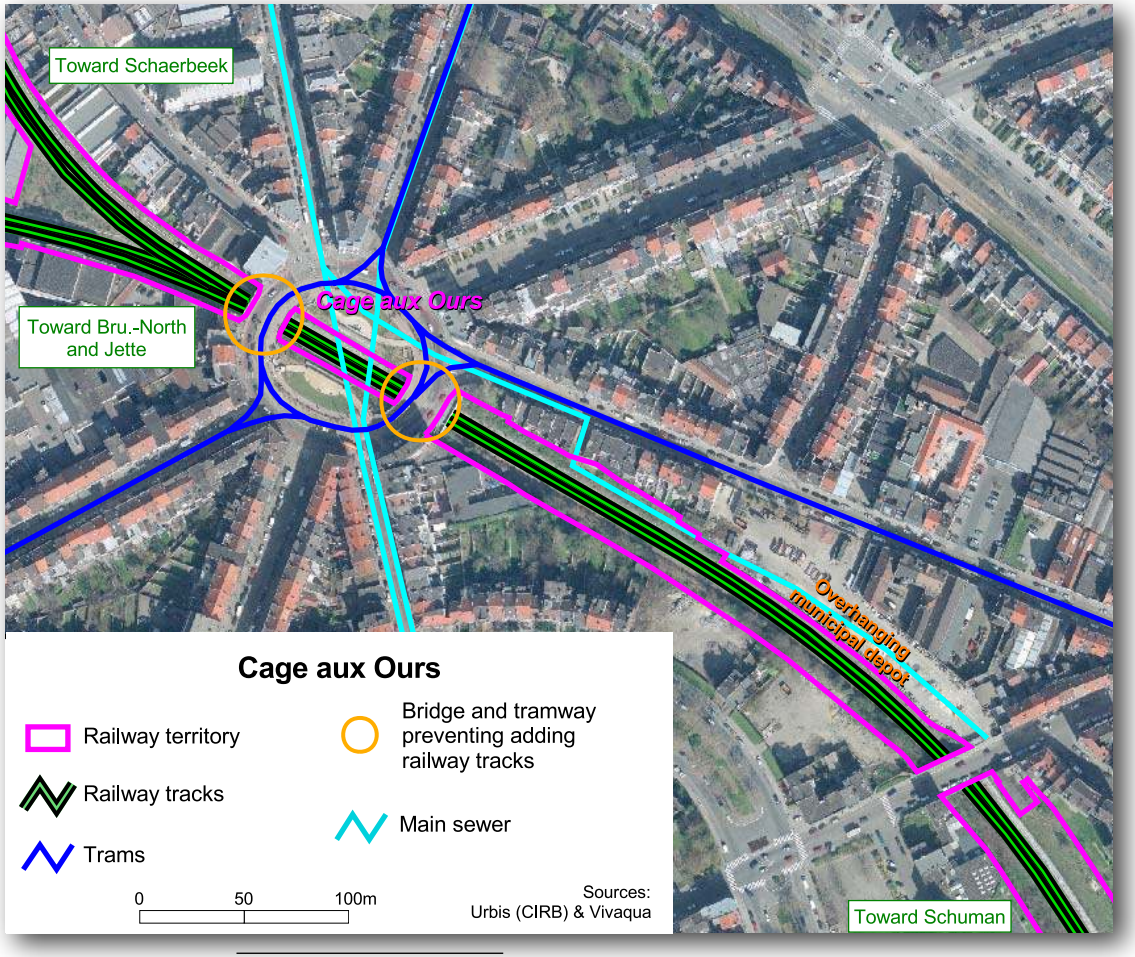


Figure 4. The Cage aux Ours station

4.3.2 The contradictions in Brussels governance: de Jamblinne de Meux

48. Located at the edge of the European quarter and the Royal Military Academy in a densely populated neighbourhood and at a hub in the STIB bus network, the de Jamblinne de Meux station appeared in the first Regional Development Plan (RDP) in 1995 in the framework of the Schuman-Josaphat tunnel project which was supported by the Region but then still under study, as well as in the Regional Mobility Plan (Iris Plan 1) in 1999. When the Federal Ministry of Communications at the time requested a so-called 'planning certificate' for the realisation of the tunnel and the doubling of the Watermael-Schuman line, it automatically included the de Jamblinne de Meux station in the planned volumes, with access through a corner building which belonged to it. However, when the project was presented to the population on the occasion of the public inquiry, part of the population took issue over the station project. Afterwards, the municipality of Schaerbeek delivered a negative opinion during the dialogue commission. The Regional Administration for the Development of the Territory and Housing[18] followed suit by opposing the station project due to the risks to the surrounding neighbourhood, in particular in terms of demand on land. In its opinion, the dialogue commission recommended that '*plans for a new station at the Place de Jamblinne de Meux should be abandoned as it is too close to Schuman station and would accentuate the pressure from the tertiary sector on this essentially residential neighbourhood, bringing the railway tracks closer together and removing the central piers* [which

[18] 'Administration régionale de l'aménagement du territoire et du logement' (AATL) in French.

would allow a platform to be built].'[19] Let us mention that the same commission carefully avoided making the same recommendation for the Germoir station, located at the same distance from the Bruxelles-Luxembourg station.

49. The municipality of Schaerbeek then delivered an official opinion concerning the request for a Watermael-Schuman-Josaphat 'planning certificate'. Globally, it delivered *'an unfavourable opinion regarding the project as presented'*.[20] It considered in particular that *'the creation of a Place de Jamblinne de Meux station – made possible by distancing the railway tracks,*[21] *would conflict totally with the wish not to bring about any socioeconomic modification in this neighbourhood and that this new station is not justified due to the proximity of Meiser and Schuman stations which should be improved'*. The municipality therefore asked for a *'commitment on behalf of the applicant to abandon the possibility to build a platform in the new tunnel and therefore to bring the railway tracks closer together in view of the unanimously negative opinion on the creation of the Place de Jamblinne de Meux station'*.

50. As it did not want the entire project to be questioned or delayed, the region therefore preferred to go along with the opinion of the dialogue commission by issuing a 'planning certificate' which banned the creation of the new station and made it physically impossible (May 1999). The region was then careful not to include the station in the 2001 RLUP in a desire to remain coherent, and removed it from the second RDP, which was adopted in 2002. Then on the occasion of studies for the second Regional Mobility Plan (Iris Plan 2), the Brussels Mobility administration re-examined the opportunity for the de Jamblinne de Meux station, hoping to influence the upcoming works, yet was unsuccessful. In 2010, this did not prevent the station from being included in the Iris Plan 2 as a 'station to be created after 2018', and therefore from reappearing in the regional urban planning arsenal.

51. The episode of the de Jamblinne de Meux station illustrates the conflicts of governance which sometimes exist in Brussels, where the distribution of power and competences are poorly defined between the region and the municipalities. It also shows the lack of unity, continuity and strategic vision among the different regional organs.

4.3.3 The challenge of the improvement and development of a site: Josaphat

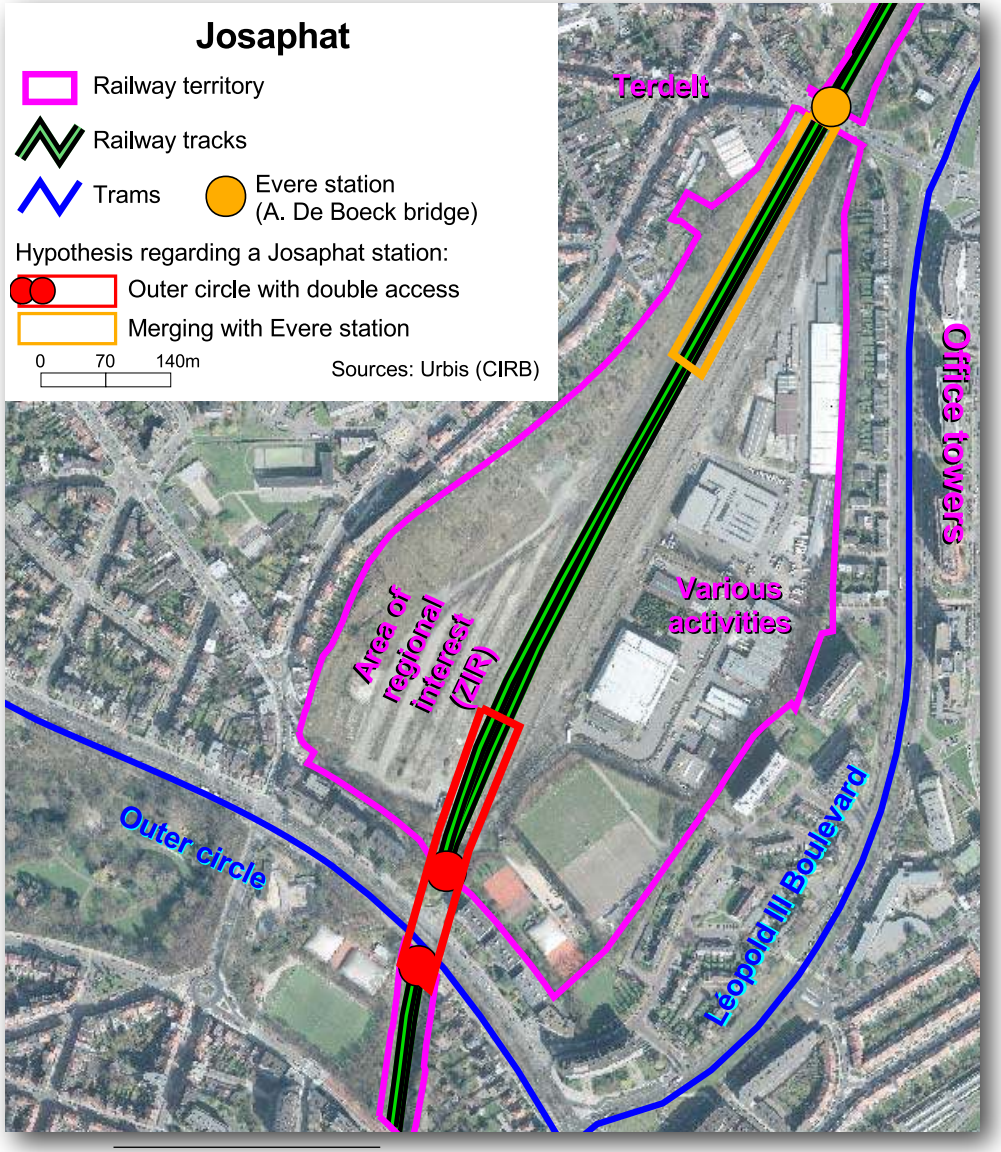
52. Contrary to the examples presented above, the Josaphat site would provide an ideal framework for the development of a new station: there is plenty of space available, the surroundings are densely urbanised and well served by STIB trams and buses, and the site itself is destined for major real estate developments (figure 5). All of the elements required to justify the development of a new station are therefore present. Various options exist, each with its advantages and disadvantages. A location at the southern edge of the site would provide an excellent connection with the trams of the outer ring while being as far as possible from the Evere station, which could therefore be kept.[22] However, the western and eastern edges of the site would be too far from the station. On the other hand, a location more towards the north of the site, close to the bridge on Rue Auguste De Boeck, would allow it to merge with the Evere station and maintain the service for the Terdelt neighbourhood, as well as allowing a connection with the new tram line on Boulevard Léopold III and the bus on the Terdelt side. In this perspective, a fundamental challenge involves the well-thought-out creation of pedestrian pathways between the platforms of the new station and the neighbourhoods bordering the site as well as the area to be urbanised. We know that local accessibility to the stations is a deciding factor for using the train (Brons et al., 2009). In particular, this involves providing access to either end of each platform. In short, it would mean not repeating the mistake made at Luxembourg station (accessible in

[19]Point C4 of the opinion of the dialogue commission of 11/5/1999 for the Watermael-Schuman-Josaphat railway connection. This document was signed by the representatives of the six municipalities concerned and three regional components (AATL, IBGE and SDRB).

[20]Municipality of Schaerbeek, undated document.

[21]i.e. the distance between railway tracks and therefore the possibility to install a central platform between them.

[22]With not necessarily all of the trains stopping at both stations.



one place only despite the particularly long platforms) or Etterbeek station, where the SNCB sold its land located between Boulevard de la Plaine and the station, without considering access which would connect the station, La Plaine campus, the new office buildings and the neighbourhood of Avenue de la Couronne and Avenue des Saisons.

53. The other challenge is to find the right balance in terms of densities and functions between the growth which the neighbourhood – in the broad sense – could absorb and the idea of urbanisation in symbiosis with mass transport such as the RER. This also raises the question as to the system of road traffic and the parking capacity at the future site, with the knowledge that providing major facilities for car users tends to put them off mass transport (Kaufmann, 2000).

4.3.4 The social challenge: Ganshoren

54. The possible Ganshoren station (close to Avenue Van Overbeke and Avenue des Neuf Provinces) located on the outer edge of Brussels has a lower potential than most of the other stations proposed by the region. This is due in particular to the fact that the space along the railway lines is urbanised only on one side, with it being impossible to urbanise the opposite side. However, the neighbourhood is made up of a disadvantaged population with a low number of car users: with an average of 39% of households without a car in Brussels, the percentage in the surrounding neighbourhood reaches 45% and even 56% when only the immediate surroundings are considered.[23] Furthermore, the RER would offer the inhabitants of the neighbourhood a more efficient alternative than mass urban transport to travel to the city centre (twice as fast during rush hours) and the European quarter (three times as fast).

55. This case is a good illustration of the role which the RER could play in the framework of a significant improvement in the accessibility of certain urban neighbourhoods. It inevitably leads to questions regarding

Figure 5. Le site Josaphat

[23]Source: Statbel.

governance of a multi-scalar nature, as the RER is created and financed by the federal authorities while in this case the benefits would be felt at regional or local level. This station also illustrates the fact that beyond the rating established with a certain impartiality, other challenges within the political and social sphere may also influence certain choices as long as they can be assumed politically and financially in the name of public service.

5. Conclusions

56. The method which we have presented is a first step allowing the new stations proposed by the Brussels-Capital Region to be ranked according to their potential relevance, considering the characteristics of surrounding neighbourhoods and the possibilities for mass transport connections. Despite the simplicity of our method and certain methodological limitations, the results appear to be quite plausible to those who are very familiar with the geographic structure of Brussels.

57. We therefore observe that a significant number of potential stations are more relevant than existing secondary stations in Brussels. Together they would improve the underground railway by providing a majority of Brussels residents with access to a rail service of a high capacity with an exclusive right-of-way. We may therefore consider that most of the region's demands are not disconnected from the geographic realities which underlie the potential transport demand. This also confirms the usefulness of the railway in contributing to the quantitative and qualitative reinforcement of the intra-urban mass transport service. Many foreign cities have made plans for railway use long before Brussels. However, we cannot deny the technical difficulties involved in building and/or operating new stations, in particular those which combine high potential and spatial integration in dense neighbourhoods.

58. Our results do not of course constitute a truth in themselves. They must be considered together with economic and technical analyses, and are aimed at shedding light on the public and political debate but are not meant to act as a substitute. This leads to a possible challenge for the SNCB which – although federal – should perhaps turn its back on the idea that its mission is to focus only on medium- or long-distance connections. This inevitably raises the question as to better cooperation between the state and the region as well as between transport operators. The question regarding internal coherence within Brussels institutions (between the region and the municipalities as well as within the region) is also raised, as illustrated by the case of the de Jamblinne de Meux station.

59. Finally, we cannot ignore the inevitable awe-inspiring spectre represented by the implementation of a true fare integration for all of the mass transport serving Brussels and its outskirts. While huge sums are invested in the infrastructures, there are main uncertainties on how the RER will be operated (connections, stations, frequency and tariff options). For now we do not know the conditions of public access to the future RER. However, we have shown that the opening of new stations is partly justified thanks to the new possibilities for routes combining the networks of different operators. And this leads us back once again to the issue of governance.

The authors would like to thank Patrick Frenay (ULB) for his wise comments, Gilles Ledent for the useful information provided and Benoît Velghe for his research in the archives of the municipality of Schaerbeek. Any errors or discrepancies are the responsibility of the authors.

References

Benoît, J.-M., Benoît, P., 1995, *La France qui bouge*, Paris Romillat.

Blainey, S., Preston, J., 2010, 'Modelling local rail demand in South Wales', *Transportation Planning and Technology* 33(1), pp. 55-73.

Brons, M., Givoni, M., Rietvelt, P., 2009, 'Access to railway stations and its potential in increasing rail use', *Transportation Research Part A* 43(2), pp. 136-149.

Charlier, J., De Schutter, T., 2002, 'L'évolution du réseau ferroviaire belge dans la deuxième moitié du XXe siècle', *Les Cahiers de l'urbanisme* 40-41.

Chu, X., 2004, *Ridership Models at the Stop Level,* Final report for the U.S. Department of Transportation, National Center for Transit Research, Center for Urban Transportation Research, University of South Florida, 64 pp.

De Witte, A., Hollevoet, J., Hubert, M., Dobruszkes, F., Macharis, C., 2011, 'Modal choice and its determinants: a review from an interdisciplinary perspective', BIVEC/GIBET Transport Research Day 2011, Namur, FUNDP/GRT

Debrezion, G., Pels, E., Rietveld, P., 2007, 'The Impact of Railway Stations on Residential and Commercial Property Value: A Meta-analysis', *The Journal of Real Estate Finance and Economics* 35(2), pp. 161-180.

Dessouroux, C., 2008, *Espaces partagés, espaces disputés. Bruxelles, une capitale et ses habitants*, Brussels, MRBC, 156 pp.

Dobruszkes, F., Marissal, P., 2002, 'Réflexions sur l'usage des modèles dans les études de transports et les sciences sociales', *Recherche Transports et Sécurité* n°74, pp. 2-25.

Du, H., 2006, 'Urban comprehensive transit junction planning and design: a case study of new Guangzhou railway station', *City Planning Review*.

Facchinetti-Mannone, V., Bavoux, J-J., 2010, 'L'implantation des gares TGV en France : tensions interscalaires, jeux d'acteurs et recompositions spatiales', *Belgeo* 2010/1-2, pp. 9-22.

Frenay, P., 2009, 'A territorial development project associated with the Brussels RER. An analysis of the fundamental deciding factors', *Brussels Studies* 31, pp. 1-17.

Guihaire, V., Hao, J.-K., 2008, 'Transit network design and scheduling: A global review', *Transportation Research Part A: Policy and Practice* 42(10), pp. 1251-1273.

Gutiérrez, J., Cardozo, O. D., García-Palomares, J. C., 2011, 'Transit ridership forecasting at station level: an approach based on distance-decay weighted regression', *Journal of Transport Geography* 19(6), pp. 1081-1092.

Hamacher, H., Liebers, A., Schöobel, A., Wagner, D., Wagner, F., 2001, 'Locating New Stops in a Railway Network', *Electronic Notes in Theoretical Computer Science* 50(1), pp. 1-11.

Hubert, J.-P., Toint, P., 2002, *La mobilité quotidienne des Belges,* Namur, Presses universitaires de Namur, 352 pp.

Hubert, M., Dobruszkes, F., Macharis, C., 2008, 'Mobility to and from, around and about Brussels', *Brussels Studies*, Synopsis no. 1 for the Citizens' Forum of Brussels, pp. 1-14.

Kaufmann, V., 2000, *Mobilité quotidienne et dynamiques urbaines – la question du report modal*, Presses polytechniques et universitaires romandes, 252 pp.

Kaufmann, V., 2008, *Les paradoxes de la mobilité. Bouger, s'enraciner*, Lausanne, Presses polytechniques et universitaires romandes, 115 pp.

Laporte, G., Mesa, J., Ortega, F., 2002, 'Locating stations on rapid transit lines', *Computers & Operations Research* 29(6), pp. 741-759.

Lebrun, K., 2010, *Les nouvelles gares urbaines. Opportunités à Bruxelles dans le cadre du RER*, master's thesis in geography, ULB, unpublished.

Margail, F., 1998, Le *Passante ferroviario*, naissance de l'interconnexion à Milan, *Transports urbains* 100, pp. 9-14.

Merlin, P., 1991, *Géographie, économie et planification des transports*, Paris, PUF.

Ministry of the Brussels-Capital Region, 2003, *Mise à jour et adaptation du plan des déplacements urbains de la Région de Bruxelles-Capitale*, phase 2 report, volume 1, AED, Stratec, unpublished, 74 pp.

Misonne, D., Hubert, M., 2003, 'Les communes bruxelloises et le problème de la mobilité : entre autonomie et convergence', in Witte E. et al. (dir.), *Les dix-neuf communes bruxelloises et le modèle bruxellois*, Brussels, Larcier, pp. 231-253.

Mohajeri, N., Amin, G., 2010, 'Railway station site selection using analytical hierarchy process and data envelopment analysis', *Computers & Industrial Engineering* 59(1), 107-114.

Négrier, E., 2005, *La question, métropolitaine, les politiques à l'épreuve du changement d'échelle territoriale*, Grenoble, PUG, 270 pp.

Orfeuil, J.-P., 2008, *Une approche laïque de la mobilité*, Paris, Éditions Descartes & Cie, 173 pp.

Preston, J., 1991, 'Demand forecasting for new local rail stations and services', *Journal of Transport Economics and Policy* 25(2), pp. 183-202.

Significance, Stratec, Tractebel, Tritel, 2009, 'Evolution et optimisation du Réseau Express Régional de Bruxelles et de ses environs. Développement 2015 et vision aux horizons 2020 et 2030'. Report for the Federal Public Service Mobility and Transport, Brussels, 86 pp.

Subra, P., 2007, *Géopolitique de l'aménagement du territoire*, Paris, A. Colin, 327 pp.

Tritel and Aries, 2007, *Étude du potentiel voyageurs et de l'intermodalité des gares RER*, study conducted for the FPS Mobility and Transport, final report for sections 1 and 2, unpublished, 134 pp.

Yuan, J., Hansen, I., 2007, 'Optimizing capacity utilization of stations by estimating knock-on train delays', *Transportation Research Part B*, 41(2), pp. 202-217.

To cite this text

Kevin LEBRUN and Frédéric DOBRUSZKES, « New RER stations for Brussels? Challenges, methods and constraints », *Brussels Studies*, Number 56, January 16th 2012, www.brusselsstudies.be

Links

Other versions of this text are available

ePub FR : http://tinyurl.com/BRUS56FREPUB

ePub NL : http://tinyurl.com/BRUS56NLEPUB

ePub EN : http://tinyurl.com/BRUS56ENEPUB

pdf FR : http://tinyurl.com/BRUS56FRPDF

pdf NL : http://tinyurl.com/BRUS56NLPDF

pdf EN : http://tinyurl.com/BRUS56ENPDF

The videos published in *Brussels Studies* can be watched on the *Brussels Studies* Vimeo channel, available here :

http://vimeo.com/channels/BruS