



Netherlands Board for  
Healthcare Institutions

## LCC, life cycle costing, lucrative and crystal clear!

**The Dutch healthcare system has undergone immense changes in recent years. After some 20 years of intense debate, the new health insurance act is without a doubt a giant step. However, this legislation is not the end of the story; it is the first part of an entirely new healthcare system that fosters competition and pricing based on costs and margins.**

This is also having a profound effect on the construction of healthcare institutions. Besides the end of the construction regime of the *WTZi* (Healthcare Institutions Act), the new system also means that there will be other considerations and procedures to deal with. Instead of the present mandatory Long

Term Accommodation Plan, the bank will now expect to be presented with a business plan. Without a permit, compensation for capital costs will no longer be guaranteed in advance, so it will be necessary to investigate whether insurers are prepared to continue contracting for institutional services. The emphasis on construction-related aspects will also change. While in the past it was a sport to go for the maximum square metres when negotiating with the NBHI and the Ministry, now one has to weigh up between the size of the investment and its affordability in the light of an uncertain revenue flow.

Another changing aspect is a shift in emphasis from the size of the investment sum to the running costs that the investments will demand. In other words, what matters is not simply the size of the investment, but above all what using the new building will cost in subsequent years.

### FOREWORD

In the near future, the cabinet plans to make healthcare institutions responsible for the total property costs of their facilities. This has prompted the Board to develop a method for hospitals (as the first users) to calculate their mean annual property expenses.

In addition to the construction costs, this LCC (life cycle costing) model also takes account of building-specific running costs, the costs of adaptations due by new regulations and social and medical-technological developments, the service life and the functional adaptability of buildings.

The Board will implement the tool stepwise among hospitals, refining the tool and associated processes as it goes. The first six hospitals will start in November 2006. The intention is to develop a similar LCC tool for the long term care sectors at a later stage.

## Life cycle costing

Life cycle costing is a tool that offers improved insight into the financial effects of owning and running a building. Life cycle costing (LCC) can be defined as “a method for planning, developing or tendering of investment plans, in which it is important to estimate and compare the costs of the investment project itself, the acquisition of property, running and sustaining the capital project during

a period of use, and the ultimate disposal by sale, demolition, etc.” In this way, LCC makes the picture of property costs complete. This method can be used to compare alternatives or as an aid to long-term financial planning.

# LCC-model developed by the NBHI

**The NBHI has now developed a model that enables the effect of the intended investments on the operating budget to be forecast during development of the construction plans. The purpose of the model is to weigh-up the capital costs against the building-related costs over the entire life cycle of the building.**

Costs that are relevant to the model therefore include the initial investment, the expenses incurred by the building in fulfilment of its function (energy, insurance, etc.), the costs of sustaining the building for the period of use, and the costs incurred in disposing of the building at the end of that period.

Given that the model aims to predict the operating budget consequences of investment decisions over the period of use of the building, it is essential for these future expenses to be put in a form that enables comparison.

This is accomplished by calculating the cash value of all these future expenses. The model identifies four levels, and depending on the planning phase, these are used to carry out certain exercises and consider alternatives. Obviously the ‘pay-off’ will be the greatest at the start of the process of construction plan development, when strategic decisions have to be made. At this point however, the availability of information is still limited.

LCC is not new; it is already used in several variants in many other sectors, e.g. manufacturing. Nevertheless, LCC is relatively new to the healthcare sector. The NBHI believes that this may be because a number of healthcare sector-specific characteristics have not been adequately factored into the models that have been developed until now.

One aspect affecting healthcare in particular is the turbulence caused by changes in demand, ICT developments, medical technology, etc. An inflexible building design will all too quickly give the new hospital the reputation of being obsolete on the day it opened its doors. Although – or perhaps, because – not every development can be foreseen, a degree of inbuilt adaptability should be considered when designing new buildings. A readily-adaptable building can ultimately

yield great benefits, due to the relative ease and economy with which all kinds of modifications can later be implemented. In recognition of this aspect, a separate adaptability module has been developed within the LCC model.

## What types of questions/decisions does this model support?

LCC is useful for evaluating such options/decisions as:

- I have two locations with existing buildings. Is it worthwhile to combine these at a single location with fewer total square metres?

### Incidentally ....

The ultimate goal is not the lowest possible LCC *per se*. The degree to which the chosen alternative supports business operations is also important. In that sense LCC is a starting point for jointly investigating how the different scenarios score on other aspects as well, for example, logistics. The revenues from production of DBCs (complete treatment for a fixed price) form another aspect.



- Does it make sense to dispose of a certain part of an old site with high maintenance costs, and partially replace it with new construction? Or would it be smarter to extend the life cycle of an old location by means of renovation?
- I want to erect a new building with a low LCC. Does it make sense to invest more up-front in order to have lower maintenance expense for the entire lifecycle?
- Should I really be planning on the basis of a 40 year life cycle? Or is it wiser to design a building with a shorter life cycle?
- How can I take account of future developments in my plan without paying too much? In other words: Should I implement certain aspects differently or more sparsely, so that possible changes to the required functionality do not trigger the first adaptations too soon after handover?
- During a construction project, the suggestion rises to 'strip' the plan qualitatively, in order to stay within the investment budget and avoid cost overruns. Wouldn't this 'stripping' mean that I will have to pay later anyway, in the form of sky-high running costs?

### What does the LCC model look like?

The following (cost) aspects are covered by the model:

- The *capital investments* specific to a certain scenario;
- *MOM expenses*. (Management, Operation and Maintenance), also referred to by the NBHI as building-related running costs. These are items such as maintenance, energy, cleaning, etc. These expenses have a large impact because every square metre built also has to be maintained during the entire life cycle. Moreover, a relatively old building generally has higher MOM expenses than a newly-completed building;
- *Development costs*. What this covers is the cost of adaptations demanded by new regulations and social and medical-technological developments. These costs also vary per function;
- *Life cycle*. The life cycle is no longer seen as a constant value of 40 years. The life cycle of a building can also vary. For example, you might choose to erect a building for 25 years of use, and not to carry out any midlife renovation;

- *Adaptability*. The building must continue to fulfil its functional requirements. The institution will obviously want to avoid having to make modifications right at the start of the building's service life. Post-completion adaptations are virtually always costlier than those made during construction. The LCC model enables different alternatives to be calculated and compared on all these aspects.

#### *Different levels of abstraction*

The model works with different levels of abstraction. The information on hand at the start of a project is vastly different to that when a complete programme of requirements is on the table. The model takes account of this. The NBHI places the primary focus on the more strategic levels. Incidentally, the model offers the flexibility of being able to zoom in on a specific aspect, while other factors continue to be handled at a higher level. (For example, if the choice is made for a façade requiring relatively costly maintenance). There are four levels:

## The 1:5:200 rule

Project developers make extensive use of the so-called "1:5:200 rule". This rule, also frequently encountered in literature on office real estate, represents the relationship between capital costs, the running costs of the building and the commercial value of the activities that take place in the building.

capital costs	building running costs	value of commercial activities
€ 1 mln	€ 5 mln	€ 200 mln

The 1:5:200 rule means that the running costs of a building over its service life will be five times the initial investment in construction. However, the costs of the production process accommodated within that building, calculated over the service life of the building, will be some two hundred times the initial cost of construction.

Considering just the relative size of the numbers in this table, one is quickly inclined to opt for the cheapest possible design. However, the rule is purely theoretical, and it only indicates the average ratios. In practice there is a strong interaction between the three factors.

When a project is subjected to inappropriate cutbacks, the effect on the running costs and costs of the primary business process can in fact be strongly counter-productive. In contrast, design improvements aimed at creating a building with favourable operational characteristics can yield many years of considerable economic benefits.

1. *Global phase*: there is little more than a target number of square metres per relevant function (OR, nursing). No specific information is available at this point.
2. *Strategic phase*: the investments now get calculated at main element level (architectural, electrotechnical, etc) and the MOM expenses are categorised.
3. *Design phase*: this phase entails calculations at element level. The MOM costs are subdivided into 16 aspects (cleaning, energy, etc.).
4. *Calculation phase*: detailed calculation at material level takes place in this phase. It is even possible to state the frequency of maintenance and replacement per individual material type.

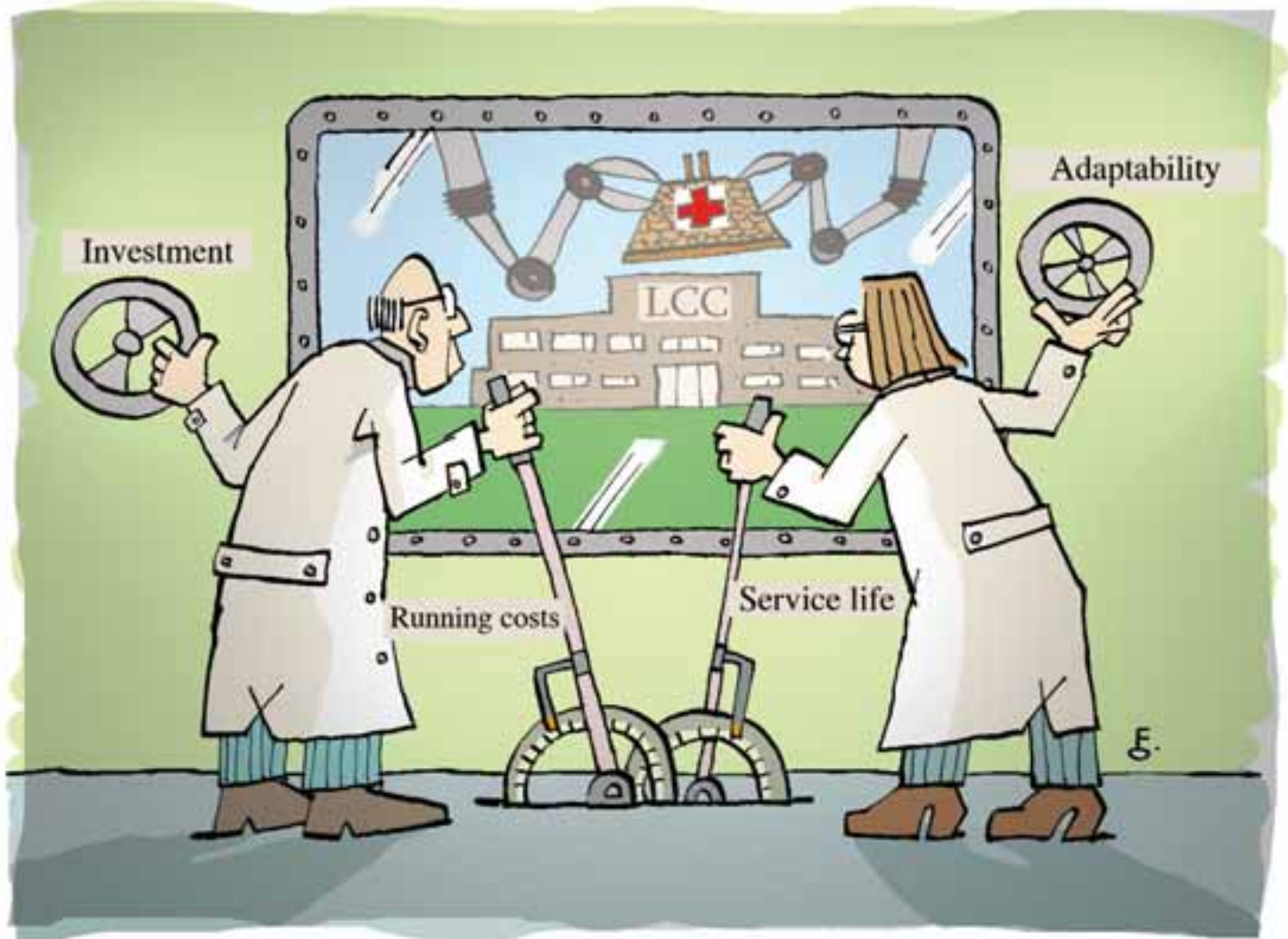
#### Key figures / benchmark data

The LCC model is seeded with a large number of benchmark figures. For a specific project, one need only state where it deviates from the standard data, making it possible to begin at once to use the model. The following benchmark data is used:

- *Investments*. For investments, the model uses the key figures and analyses that are applied in the annual Building Costs Note of the NBHI.
- *MOM Expenses*. The Prismant annual figures are the source for this purpose. These were not yet distributed over the various functions. In order to achieve this, a certain weighing factor has been applied to the

MOM expenses, based on NBHI experience. For example, it is known that the maintenance costs for an OR are higher than those of a nursing ward.

- *Development costs*. These costs are based on assumptions of how often a specific function will be renovated (expressed in architectural, engineering and electrotechnical costs). For certain functions, this will take place at a higher frequency and at higher costs (expressed in a percentage of the initial capital costs). In addition, a distinction is made between the actual technical/functional development costs, and the costs that accompany technical replacement/obsolescence, insofar as these costs are not covered by the MOM expenses.



# In practice **LCC-model**

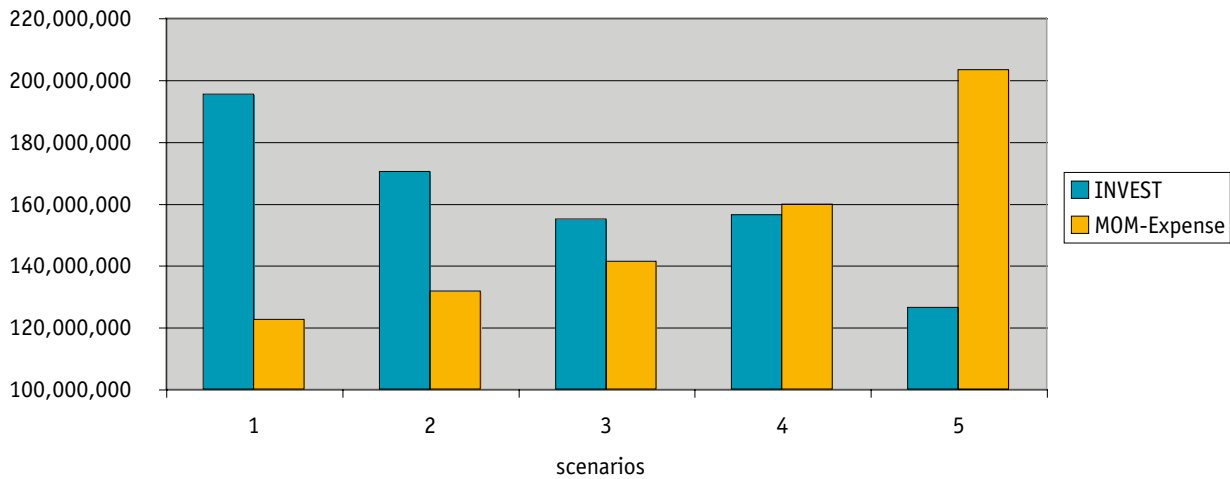
To give an idea of how the model works, we have conducted a scenario study. The example is drawn from a typical everyday situation, in which a hospital is confronted with long-term options: whether or not to concentrate the organisation at one site and/or retain and reassign the present oversized buildings and/or accept large operational losses.

In this study we are looking at a merged hospital operating with two sites, located relatively close together in the same city. The site at which the main hospital is located is very spacious, and therefore has a low building density on the grounds. The main building is a typical Breitfuss-type structure from the seventies, with a floor area of approximately 65,000 m<sup>2</sup>. Adjoining this building is a new polyclinic wing of approximately 8,000 m<sup>2</sup>, which has been in use for a few years. The second hospital is located on a site with limited space. The main building dates from the early sixties and has a floor area of approximately 30,000 m<sup>2</sup>, while an extension of some 10,000 m<sup>2</sup> was occupied only recently.

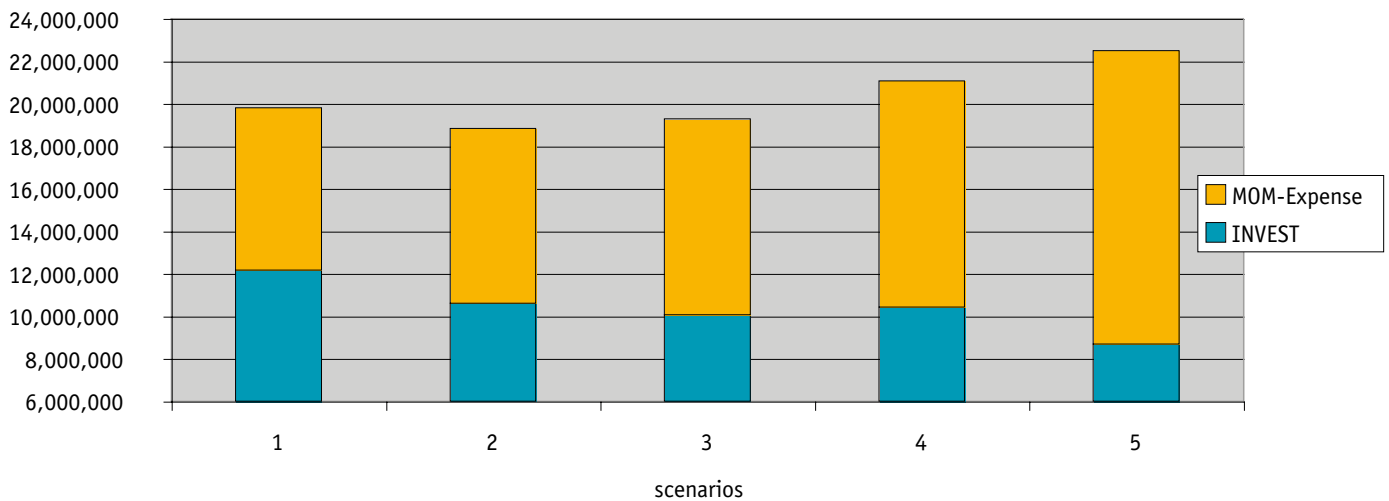
Architecturally, the functional quality of the older buildings on both sites is poor: both main buildings are in need of renovation. The functional quality of the new buildings is good in an architectural sense. Five scenarios have been explored in the study (see table below). The necessary input is based on our own assumptions.

<b>Scenario 1</b>	<ul style="list-style-type: none"> <li>• Construct complete replacement at one site.</li> </ul>	81,000 m <sup>2</sup> total
<b>Scenario 2</b>	<ul style="list-style-type: none"> <li>• Main site: retain recently-built wing; demolish and replace the old buildings (64,000 m<sup>2</sup>)</li> <li>• Secondary site: retain and refurbish recently-built wing; dispose of main building</li> </ul>	82,700 m <sup>2</sup> total
<b>Scenario 3</b>	<ul style="list-style-type: none"> <li>• Main site: retain recently-built wing; strip top off high-rise; renovate retained older parts, construct new nursing ward</li> <li>• Secondary site: retain and refurbish recently-built wing; dispose of main building</li> </ul>	87,700 m <sup>2</sup> total
<b>Scenario 4</b>	<ul style="list-style-type: none"> <li>• Main site: retain recently-built wing; renovate old building, construct replacement building</li> <li>• Secondary site: retain and refurbish recently-built wing; dispose of main building</li> </ul>	98,700 m <sup>2</sup> total
<b>Scenario 5</b>	<ul style="list-style-type: none"> <li>• Main site: retain recently-built wing; renovate entire old building</li> <li>• Secondary site: retain recently-built wing; renovate main building</li> </ul>	111,200 m <sup>2</sup> total

## Investment and MOM (net cash value)



## Total annual costs



Scenarios 2 through 4 assume that the secondary site is transformed into a day-admission hospital, with the old building at this site being disposed of. A hospital with exclusively single-bed rooms will then be realised at the main site. While this approach fits comfortably into the existing high-rises in terms of ward sizes, it also leads to oversizing in terms of space.

An LCC computation has been carried out for each scenario. The outcomes can (obviously) also be presented graphically. The upper graph on this page shows the total capital costs and the sum of the MOM expenses (building-related running costs) over the life of the various buildings.

As a consequence of the choice for complete replacement of all buildings, scenario 1 calls for the most investment. Scenario 5 requires the least investment thanks to the limited new construction and renova-

tion. However, because of the differences in both the floor area per phase and the technical quality of the resulting buildings, the MOM expense shows the exact opposite. The difference in MOM expense across the various scenarios is striking.

The lower graph presents the sum of the annual capital costs and MOM expense. This enables one to see at a glance which scenario scores the lowest annual cost. Scenario 2 thus generates the lowest annual cost, followed closely by scenario 3. Scenario 1 turns out to be more expensive due to the proportionally (excessively) high capital costs; which are not fully compensated by reduced MOM expense. Scenarios 4 and in particular 5 yield the highest annual burden due to the profligate use of space, the high MOM expense resulting from poorer technical quality, and the substantial capital costs called for even by these scenarios.

# Step by step plan roll-out in groups

**The LCC model is available to users as a tool. However, the tool itself is simply the tip of the iceberg. Arranging wide-spread distribution of the model on CD would therefore defeat the purpose.**

There are important grounds for taking a cautious approach:

- *(International) expertise in LCC* Users need to properly understand the consequences of specific options in the model.
- *Expertise in hospital construction in the Netherlands* Considerable expertise in hospital construction (investment and running costs) is a must for those working with the tool.
- *Key figures*

A first calculation is readily made using the key figures included with the model. However,

it is vital to understand the background to these key figures, otherwise there is a genuine risk of false confidence in the outcomes. And depending on the project, key figures also need to be adjusted. The model makes allowance for this, but (highly-qualified) construction costing expertise remains necessary.

In other words, the tool is of little use without the expertise of the NBHI to help the user make the right choices. With so many variables to consider, caution is advisable.

## Future LCC-model

**The future of the LCC model can be summarised as: more depth, more scope.**

- *More depth in benchmarks:* to this end, the NBHI participates in "EuroFM in Health

Care" and other initiatives, conducts its own analyses and shares its know-how with the Government Buildings Agency (*Rijksgebouwendienst*).

- *More scope by extending to long term care:* the current LCC model is focused on hospi-

tals. The intention is to make the model suitable for the entire long term care sector. The 'how and when' will be announced soon. This will depend largely on acquiring reliable data on the building-related running costs in the long term care sector.

## Want to know more?

"The role of life cycle costing in capital investment in healthcare facilities" is a recent study by Barrie Dowdeswell, Executive Director of the European Health Property Network (EuHPN). The author makes a comprehensive assessment of the LCC method applied to developing efficient strategic property management in European health care. The study is available from our website [www.bouwcollege.nl/english/finance\\_procurement\\_and\\_building\\_cost/general](http://www.bouwcollege.nl/english/finance_procurement_and_building_cost/general).

## COLOPHON

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# The Netherlands Board for Healthcare Institutions: a profile

The Netherlands Board for Healthcare Institutions (NBHI) focuses on the accommodation of intramural healthcare facilities. Its field of work includes hospitals, nursing and residential care homes, mental healthcare institutions, and institutions for care for the disabled. It is one of the (autonomous) organisations tasked with implementation by the Ministry of Health, Welfare and Sport.

## Programme of work

The NBHI conducts research into current developments at the interface between healthcare and architecture, and reports on the consequences of policy decisions taken by the Ministry of Health. Research priorities are based on a programme of work approved by the Ministry. The results are published in reports available both in printed form and as files to be downloaded from the website [www.bouwcollege.nl](http://www.bouwcollege.nl). The subjects vary from privacy in nursing homes to lifecycle costs and strategic real estate policy.

The NBHI specifies the performance requirements describing the minimum functional and architectural quality to be complied with by healthcare institutions when submitting construction projects (see below). These minimum requirements are augmented by best practice examples, as an aid to institutions during the preparation of a construction plan. The financial guidelines for construction initiatives are published in an Annual Memorandum on Construction Costs.

Periodic monitoring research is also conducted into the current functional and architectural quality of institutions in each sector. Based on the results of this research and available capacity data, the NBHI calculates a construction demand for the Ministry.

## Building permits

Healthcare institutions require both a license and a building permit for new construction projects and major renovations. Licenses are granted by the Ministry of Health. The NBHI considers applications for building permits and issues them.

Because it is not uncommon for a construction process to slow down or even stagnate, the NBHI has a team of expeditors specialised in getting these construction projects back on track.

## Providing expertise

The NBHI thus has accumulated considerable expertise over a period of years. This knowledge and experience is widely utilised to support healthcare institutions, and to provide the Ministry, insurers and healthcare offices with information regarding construction for healthcare. This aspect has a broad scope, including evaluation of integral building quality, the impact of the introduction of performance-based funding on accommodations, and the infrastructural consequences of care coordination programmes.

By announcing open creativity competitions, the NBHI has fostered innovation in architectural design, giving a new impulse to developments at the interface between healthcare and architecture.

In the next few years government involvement in healthcare construction will diminish. This will have particular consequences for the way in which healthcare institutions handle their property investments; they will have to earn back those investments by means of their activities, in other words, through their products. In future, the NBHI wishes to help pave the way for these changes by applying its expertise where needed.

## Contacts abroad

At a European level, the NBHI is actively involved in the European Union Health Property Network (EuHPN). A platform for comparable organisations throughout Europe, this is where knowledge and experience are exchanged on current issues such as market forces, strategic real estate policy, public-private cooperation (PPC), healing environments and care pathways.