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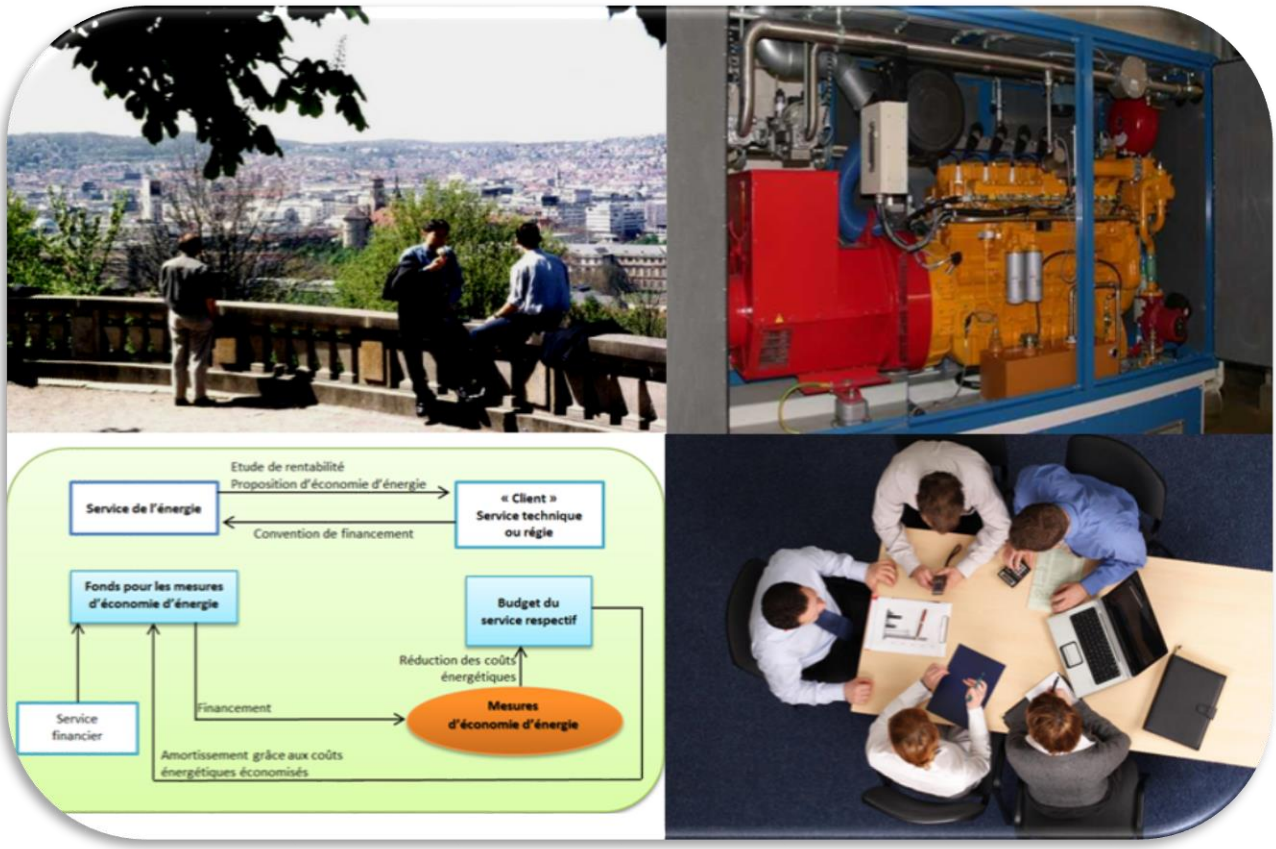
Intracting

Internal performance contracting



Intracting - Internal performance contracting

Report prepared by Energy Cities

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Energy Cities, the European Association of local authorities in energy transition, thanks the Caisse des Dépôts for its support in reinforcing initiatives with French cities and local players, especially following the adoption at the end of 2012 of the European Directive on energy efficiency (Directive 2012/27/EU of the European Parliament and the Council of 25th October 2012) and the launch of a national debate on energy transition in France in early 2013. The Caisse des Dépôts support covers two areas: energy transition in towns and cities and energy efficiency in universities.

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1. Idea and vision

French municipalities are characterised by their very high number and extreme diversity, both in terms of size and available financial resources. Buildings[1] cover 200 million m² and are responsible for 43% of total energy end-use, tertiary buildings accounting for one third of such consumption. Since 40% of tertiary buildings are owned or rented by the central government, public companies or local and regional authorities, the energy saving potential of municipal buildings is highly significant.

Budgetary constraints, including the internal financial organisation of many authorities, have often blocked useful and necessary energy-saving investments, a situation local authorities' technical services have rarely been able to oppose even though the proposed energy-efficiency measures were economically viable. The economic and environmental crisis has led local authorities to find new ways to act and take responsibility for their energy and water use.

Energy- and water-saving measures in municipal buildings can be financed in many different ways. There are a great number of possibilities and each have their positive and negative aspects that have to be considered in view of the specificities of each local authority. The difficulty lies in the implementation of energy-saving measures, which often fail for lack of funding or because other financing options cannot be tested, even though reduced energy costs generate financial resources that can be used to finance other investments. The challenge is therefore to build a project financing scheme that is both economically viable in the short term and capable of generating energy savings.

2. The role and function of local authorities

The strong dependence of countries on energy imports and increasing prices on the energy world market have prompted local authorities to take energy efficiency and energy saving measures. In this context, municipalities have to be proactive, they have to develop change strategies and be able to respond to significant change in a timely manner. It is their responsibility to adapt to new constraints and to ambitious climate protection objectives.

Some cities have created a department responsible for dealing with environmental and energy issues, including monitoring the municipal building stock's energy optimisation through improved management. Since the municipal building stock is directly managed by the local authority, it can decide to become a role model and implement energy measures, thus setting an example to citizens and other organisations. These also serve to demonstrate that renovation projects can significantly reduce energy use and generate savings covering investment costs.

[1] Source: ADEME – Study on the use of PICO public funds to start energy performance improvement work in public buildings

3. Intracting scheme: Principle

The municipal internal performance contracting scheme, also known as “Intracting” in Germany, is based on the “Contracting” concept but is entirely financed from municipal budget funds. The energy department finances cost-efficient energy and water saving measures. The savings made by the technical department or municipally-owned company on their energy bill are used to repay the energy department until full recovery of the investment capital. The technical department or municipally-owned company then can freely dispose of the savings. The energy department therefore provides zero-interest loans to finance specific measures or packages of measures with no increase charged for risks, rewards or ROI. It is imperative that a thorough analysis of the potential energy savings and a cost-efficiency study be carried out prior to any intracting scheme. Having the right skills and responsibilities available within the energy department is also essential as successful intracting requires monitoring energy efficiency.

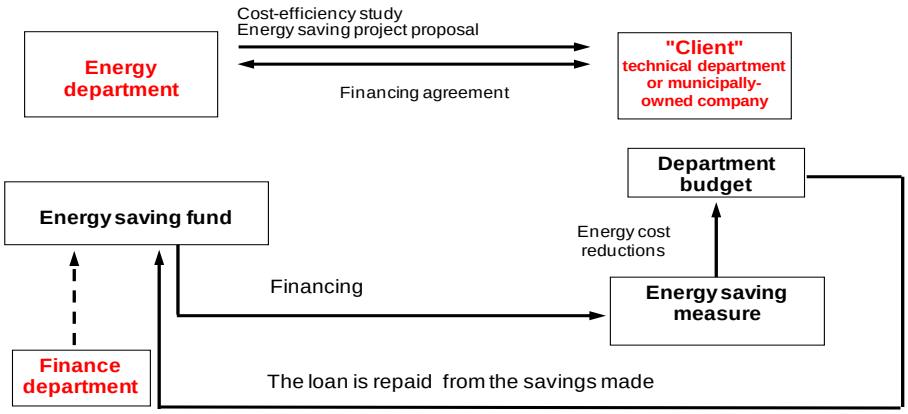


Image 1: Intracting financing scheme

Intracting is based on the following process: the city’s energy department or one of its technical departments submits an energy saving project. The project is examined by the energy department, which calculates the project’s energy saving potential. If the payback period proves acceptable and the project cost-effective, an agreement is signed between the contracting parties, i.e. the energy department on the one hand and the municipal department or company managing the building on the other hand. Repayments start the year following the investment and end once the capital invested has been fully repaid. These repayments are then used to finance other projects.

This financing scheme makes it possible to implement cost-effective energy saving measures regardless of the municipality’s budgetary constraints, therefore contributing to improving the municipality’s financial situation. Upfront capital, however, is a common barrier for many municipalities. Some cities like Stuttgart took money from the municipal budget to set up the “Intracting fund”, whilst others preferred to create a one-year fund to finance the initial measures, the savings delivered being used to create a revolving fund. Other cities like Lörrach made use of the energy efficiency support programmes developed by energy companies to increase their fund. The solutions are varied, as are the constraints inherent to each of them.

The Intracting concept is regularly debated at conferences and symposiums and in publications, and municipalities are eager to obtain information about it. This increasingly popular local financing scheme is perfectly adapted to regional authorities or not-for-profit organisations' competencies.

4. Intracting in Stuttgart

The concept of Intracting was first experimented and adapted by the City of Stuttgart. Intracting proved highly efficient at reducing energy and water costs. It is the success of this financing model that prompted other cities and institutions to adapt it to their own context.

4.1 Presentation of the City of Stuttgart

The capital of the state of Baden-Württemberg in south-west Germany lies in the Nesenbach basin, in the Neckar valley. Stuttgart is a city of around 600,000 inhabitants in the centre of one of the most heavily industrialised German regions. Two car manufacturers, Mercedes-Benz and Porsche have their headquarters in Stuttgart. The city also has two universities, several university institutes of technology as well as the Stuttgart Institute of Management and Technology (SIMT). In total, the city has over 1,400 municipal buildings.

In its 2011 energy report, the City of Stuttgart presented the following municipal building energy use data:

- Heating: 279,523 MWh (down 14.4% compared to 2010, a significant drop due to mild temperatures)
- Electricity: 198,472 MWh
- Water: 1,685,487 m^3

Energy and water costs reached 58 million euros (€29m for electricity, €21m for heating and €8m for water). The share of renewable energy was 7.2% (20,040 MWh) for heating and 5.3% (10,422 MWh) for electricity. The public building stock's CO_2 emissions amounted to 98,800 tonnes, i.e. a 51.6% decrease compared to 1990.

4.2 Administrative organisation

[2]Management of the Intracting fund was entrusted to the city's energy department created in 1977. This department directly reports to the "environmental protection department" and is responsible for monitoring energy use, implementing innovative demonstration projects (especially in the field of renewable energy) and managing a number of grant programmes.

The stakeholders involved are three public organisations and one private company: the **energy department** in charge of managing the fund, the **municipal construction department** in charge of

[2] Source: ADEME – Study on the use of PICO public funds to start energy performance improvement work in public buildings

work follow-up, the **"client" department** (technical department or public company) and a private **consulting firm**, entrusted with project engineering.

Governance is as follows: the energy department has a comprehensive vision of energy use in all municipal buildings. It identifies the buildings with the highest energy saving potential and prepares an investment plan including a fine-tune assessment of potential energy savings and necessary investments. Once the "client" department agrees to the plan, implementation of the work is entrusted to the municipal construction department in charge of public procurement and project follow-up.

The energy department's staff is mainly composed of engineers and technicians working part time for the Intracting fund. It provides the following services:

- Project identification and energy saving potential evaluation (pre-diagnosis based on the site energy use and building condition)
- Pre-auditing of the buildings prior to starting work
- Financing agreement
- Training of technical staff responsible for building operation.

The services provided also include promoting the scheme at in-house seminars run by the fund manager and via a dedicated Webpage. Work, however, is supervised by the Municipality's construction department

4.3 Technical organisation

[3]The fund's operational scope covers all municipal public buildings, i.e. over 1,400 buildings on 566 sites representing a total surface area of 2,200,000 m^2 and including: educational establishments (39%), offices and administrative services (17%), housing units (10%), socio-cultural facilities (7%), sports facilities (5%) and other types of buildings (22%). As a general rule, the fund is used for projects with an energy saving potential. Project eligibility is essentially based on payback time, which could (initially) not exceed 75% of the theoretical lifetime of the equipment or renovation. The eligibility criterion was increased in 2006: the payback time now has to be shorter than the theoretical lifetime, thus enabling a greater number of projects to be adopted.

The types of projects financed include: insulation work, the installation of wood-fired heating systems, the installation of CHP systems, lighting renovation, regulating device renewal and facilities using renewable energy.

[3] Source: ADEME – Study on the use of PICO public funds to start energy performance improvement work in public buildings – data partially updated or completed

4.4 Legal organisation

From a legal point of view, the scheme is a ring-fenced zero-interest rate loan available to technical departments. The loan is used to implement energy and financial measures and is repaid into the fund from the savings made on energy costs. Payback time varies depending on the energy measure, its cost and expected resulting energy savings.

If the energy efficiency measures prove cost-efficient, an agreement is signed to formalise the financing scheme. The agreement typically includes the following clauses:

- Description of the energy efficiency measures to be implemented;
- Evaluation of expected energy and financial savings and of CO_2 emission reductions;
- Investment costs;
- Description of the financing terms and scope of the measures;
- Determination of repayment terms;
- Specific clauses;
- Cost-efficiency analysis;
- Description of criteria;
- Payback rate calculations.

It is possible to regroup several measures in one package. This is recommended when a measure can generate significant savings but has a long payback period. The package of measures is processed as one single measure.

If actual savings on energy costs are lower than expected, the payback period is recalculated on the basis of actual data and a rider to the agreement is prepared by the energy department. The "client" department must inform the energy department of any modifications.

4.5 Financial organisation

The fund is earmarked for investments. Fund management costs (including labour costs) are paid from the environmental protection department's annual budget, which also includes the energy department. The fund was set up in 1995 with an initial capital of 2.3 million euros. Since then, the city's treasury has been regularly putting money into the fund, which totalled 8.8 million euros in 2011. The intracting fund is expected to return to the city's treasury on termination. It is managed by a team of 11 officers from the energy department.

Individual project costs vary from a few thousand euros to over 1 million euros. Funding is provided by the energy department and allocated to the municipal construction department which serves as the contractor. Payback is between 6 and 7 years on average, up to 9 years for larger projects (worth 1 million euros and more). Part of the investment cost is provided by the "client" building managing authority.

Full or partial funding

The Intracting scheme may provide full or partial funding. Full funding is the most common option.

In the case of full funding, all investment costs are covered by the Intracting scheme. Savings on energy costs and payback rates are calculated considering the difference in energy use and cost between the old and new installation. This means that both energy and financial savings are integrated into the calculation.

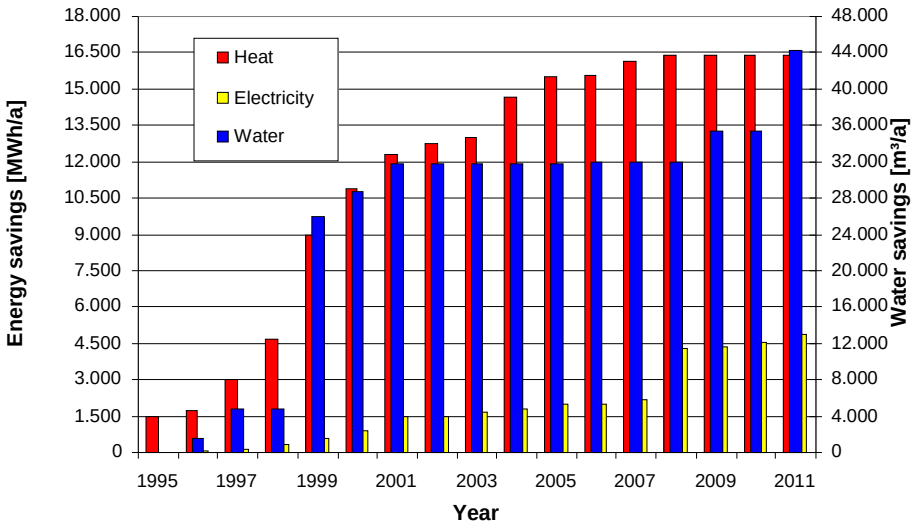
Partial funding is used to finance measures that go beyond current energy efficiency standards. For example, German standards set at 8 cm the thickness of the insulating material to be applied to facades undergoing thermal retrofitting. A 14 cm layer would of course be more efficient, generating further energy savings. In this case, Intracting may be used to finance the additional cost of applying 14 cm vs 8 cm of insulation material, the 8 cm insulation being financed by the building maintenance department. Financial savings and payback rate calculations are based on the difference between the "standard measure" and the "partial funding measure": only the savings generated as part of the partial funding scheme are taken into account.

4.6 Results

4.6.1 Energy, water, CO_2

The introduction of the internal performance contracting scheme in 1995 has made it possible to save:

- 196,000 MWh of heat,
- 33,000 MWh of electricity,
- 435,000 m^3 of water.

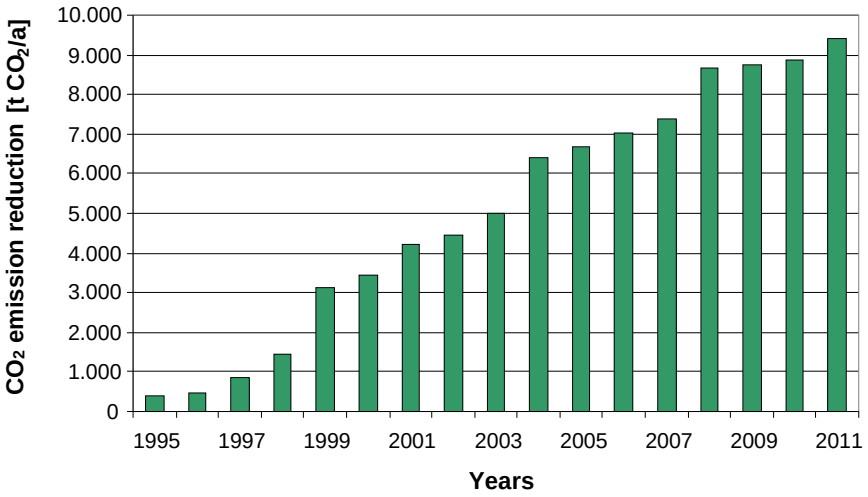


Graph 1: Water and energy savings

The above graph shows that priority has been given to reducing heating costs. The increase in electricity prices has made electricity saving measures more cost-effective and these are now back on the municipality's priority list. This has been visible since

2008 when the municipality decided to replace the electric heating system of an old people's home with a CHP unit.

As illustrated in graph 2, the municipality contributes to climate protection. In all, the projects implemented have saved over 9,000 tonnes of CO_2 annually and a total of 87,000 tonnes (accrued savings) since intracting was introduced 16 years ago.



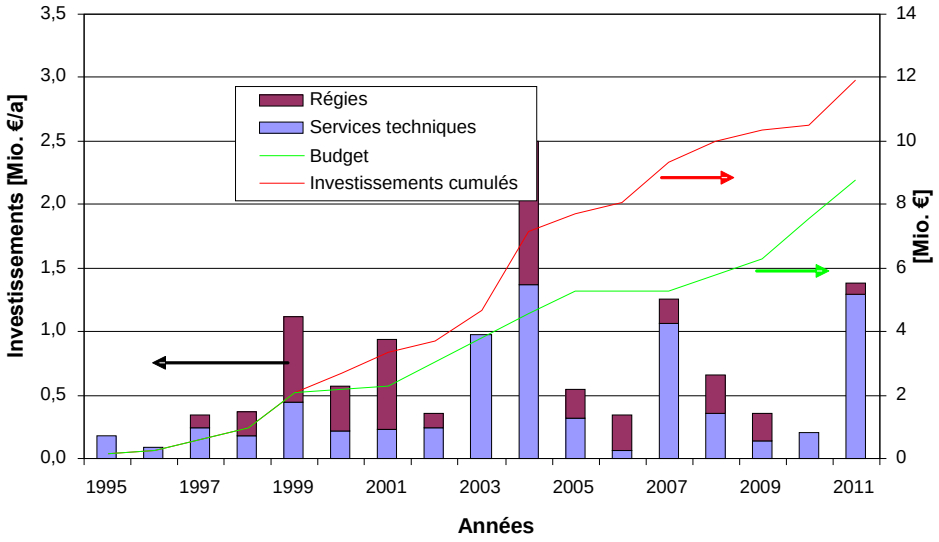
Graph 2: CO_2 emission reduction

4.6.2 Financial results

Investments

Clearly, the funding does not need to be made available all at once but can be increased gradually, depending on the municipality's budget situation, as illustrated by the green line in graph 3.

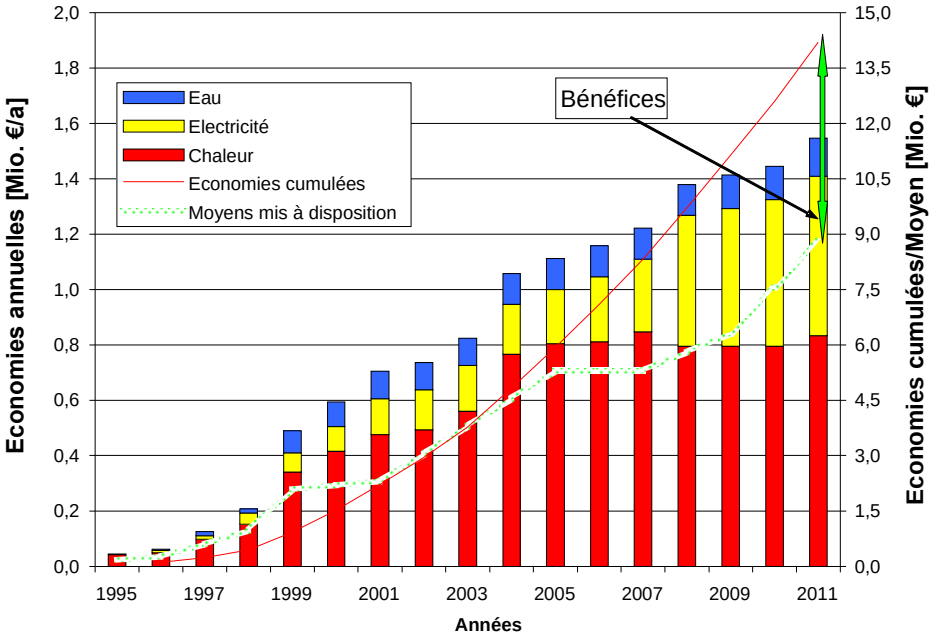
The red line represents the investments made since 1995. By the end of 2011, around 12 million euros had been invested in energy saving measures. Compared to the 8.8 million euros paid for by the municipality, this means that the initial capital has been reinvested twice.



Graph 3: Investments financed by *Intracting*

Savings on energy costs

Graph 4: the red line represents the combined savings over the 1995-2011 period and the green line the resources made available. The difference between the two lines shows that the municipality recorded a net surplus of 5.4 million euros (14.2 minus 8.8 million euros).



Graph 4 Savings on energy and water costs

Intracting is such a success that the municipality put 2.5 million euros into the fund in 2010/2011.

4.7 Feedback

4.7.1 Advantages

The advantages of Intracting over contracting are many:

- Measures can **be implemented rapidly**, with no need to include them in the "client" department's budget or to increase the municipality's debt.
- It can be used to **finance small-scale projects unlikely to be of interest to energy service companies** - like heating regulation systems, a measure costing 2,500 euros – yet too expensive to be paid for by the "client" department.
- With intracting, **the municipality has the expertise** contrary to contracting where expertise is outsourced. The economic vision of qualified municipal staff also tends to be more favourable to the municipality. Contracting also involves the risk of financing only those measures which are the most profitable for the contractor, thus disregarding the municipality's social and financial needs.
- Intracting enables the municipality to keep control over **its freedom of decision-making** in relation to equipment and building use, with no need to consult an external partner.
- **Low risk of disputes arising from the quantification or characterisation of energy savings** or from the estimation of savings not recorded by dedicated meters.
- **Savings are instantly achieved**. Compared to contracting, intracting requires minimal administrative efforts and implementation is facilitated. A change in building use, for example, does not require renegotiating the agreement.
- Intracting is **not subjected to interest rates or supplement for risks or rewards.**

4.7.2 Drawbacks

Intracting has the same drawbacks as contracting. These are:

- A **limited budget** to finance the measures.
- Payback period limited to 15 years.
- **Comprehensive retrofitting is excluded,** and new buildings cannot benefit from this financing scheme.

5. Experiences of other cities and universities

5.1 City of Lörrach

Lörrach is a city located in the south-east of the state of Bade-Württemberg in Germany. It has 49,000 inhabitants and a total surface area of 3,942 ha. In 2000 the municipality created the position of energy officer and was awarded the Energiestadt® label in 2002.

Intracting was introduced in 2002 with an initial fund of 750,000 euros over 5 years, including 250,000 euros from the climate and water protection innovation fund of Badenova, the regional public energy company. The fund is managed by the "Fachbereich Grundstücks- und Gebäudemanagement" (FB GG) department responsible for assessing energy savings and the measures' cost efficiency. Compliance criteria are clear: the measures financed by the fund must be paid off within their theoretical lifetime and they must deliver energy savings and reduce the environmental footprint. A specific feature of Lörrach is the role played by the [4]**energy saving factor,** which gives the measure its overall efficiency. Its calculation integrates cost reductions, the environmental bonus and payback. This factor is used to compare measures and implement the most efficient one provided that financial resources are available.

Contrary to Stuttgart, the savings made on energy costs by the technical departments are integrated into the municipality's annual budget. The Intracting fund is therefore integrally reconstituted to finance new measures.

In the 2002-2011 period, the municipality invested 1.37 million euros, saving 120,000 euros per year on its energy bill and reducing its CO_2 emissions by 600 tonnes annually. The Intracting fund has not been increased since its creation.

5.2 Salix Finance Ltd, United-Kingdom

Salix Finance is an independent, not-for-profit company funded by The Department for Energy and Climate Change, The Welsh Assembly Government and The Scottish Government via the Carbon Trust. Salix works in partnership with The Higher Education Funding Council for England (HEFCE) on its Revolving Green Fund.

Salix Finance enables public sector organisations to take a lead in tackling climate change by helping to increase their energy efficiency through interest-free loans aimed at financing investments in a wide range of energy efficiency projects. One of the compliance criteria is that returns on investment must be achieved within five years, thus significantly limiting the fund's action scope. On average, Salix projects have a lifetime of 13.5 years and have realised a payback

[4] Energy saving factor formula: $f_E = (3*K_{e.Einspar} + U_{Sp})/T_A$
f_E : energy saving factor
$K_{e.Einspar}$: financial savings (in k€)
U_{Sp} : environmental bonus (in tonnes of CO_2)
T_A : Payback (in years)

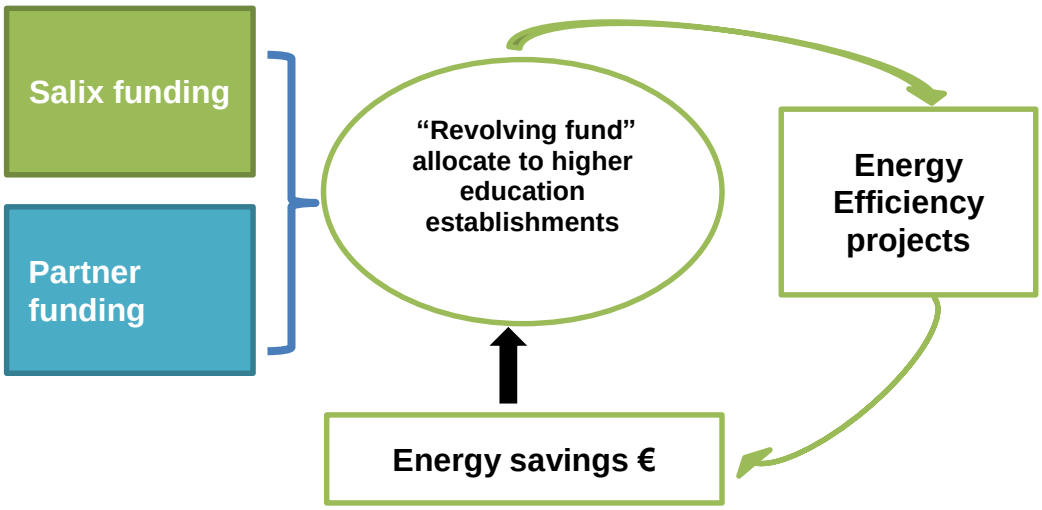
of 3.5 years. This means that once the loan is repaid, the organisation can continue to benefit from the savings on energy costs for another 10 years.

To date, Salix Finance has funded over 9,000 projects with 661 public sector bodies, valued at £194m (€220m), saving the public sector £56m (€65m) annually and £750m (€881m) over project lifetimes and delivering CO_2 emission savings of 340,000 tonnes per annum and 4.5m tonnes over the lifetime of the projects.

Salix also facilitates knowledge and experience sharing through quarterly meetings, technical meetings and project case studies to deliver long-term, cost efficient savings.

5.2.1 Revolving fund

Salix Finance works in partnership with 146 public sector organisations, providing "revolving funds" valued at £40m (€47m) matched by "client" organisations. These funds can be used by local authorities and universities to finance ring-fenced projects, generally with paybacks of less than 5 years. The financial savings are used to repay investment capital. The fund remains in place as long as energy efficiency projects need financing and is then terminated by the financing parties.



Graph 5: Salix Finance's revolving fund

5.2.2 Higher Education

Salix works with the Northern Ireland and Scottish governments to reduce Higher Education's carbon footprint. In England, Salix works in close partnership with [5]HEFCE on a common fund called "Revolving Green Fund". The aim is to achieve better control of CO_2 emissions and improve energy efficiency in this sector. The revolving fund in financed by HEFCE and Salix Finance in

[5]See the HEFCE Website: http://www.hefce.ac.uk/whatwedo/lgm/sd/rgf/ and http://www.hefce.ac.uk/pubs/year/2012/cl292012/#d.en.76019

equal portions. The fund has two strands: one for small-scale programmes and one for retrofit programmes, that is, programmes combining several measures with longer paybacks.

University of Exeter

To reduce the environmental impact of its buildings, Salix Finance and the University prepared a cost-efficiency study which demonstrated the immediate and long-term saving potential of refurbishment operations (including improving building tightness and the installation of a ventilation system and monitoring and control equipment) on a 1960's building. The University was granted £1.2m (€1.4m). Energy retrofitting and equipment are expected to deliver £20k in financial savings per annum and over £562k (€660k) over the lifetime of the energy equipment.

Data on the University of Exeter's project:

- Funding: £1,166,122 (€1,366,111)
- Annual financial savings: £348,487 (€408 k)
- Annual CO_2 savings: 1,408 t
- Total financial savings: £4,597,272 (€5.4m)
- Total CO_2 savings: 21,412 t
- Payback: 3.3 years

University of St Andrews

The university applied for funding and was granted £24m to finance a total of 120 measures which delivered energy savings of over £615,164. The measures included improving and/or replacing the boiler, the data centre's cooling system, lighting and a CHP unit.

Data on the St Andrews University project:

- Funding: £2,475,061 (€2,9m)
- Annual financial savings : £615,164 (€720 k)
- Annual CO_2 savings: 3,479 t
- Total financial savings: £7,885,773 (€9,2m)
- Total CO_2 savings: 44,690 t
- Payback: 4 years

5.3 State of Bade-Württemberg

The State of Bade-Württemberg, in the south-west of Germany, is the third largest German state in terms of both area and population (35,751 km^2 and 10.8 million inhabitants). The state has around [6]8,000 public buildings representing a net surface area of 11.5 million m^2. 78% of the buildings were built before 1978 and 15% between 1978 and 1995. The state's building stock therefore shows significant retrofit potential.

The VIRE ("Verfahren zur Optimierung haushaltechnischer Anlagen über verwaltungsinterne Refinanzierung") programme was introduced in 1996 to finance energy efficiency measures in

[6] Source: http://www.um.baden-wuerttemberg.de/servlet/is/103570/Klimaschutzkonzept_2020PLUS.pdf, page 123

state-owned buildings. The measures must pay for themselves within 10 years and cannot exceed €375,000. Money comes from the state's operational budget. The VIRE fund was set up with a one-off grant of €4.5m. Strict compliance conditions limit retrofitting options as a limited number of monitoring and control equipment is eligible. A cost-efficiency analysis is carried out for each measure using the present value method. To date, the "VIRE" financing scheme has financed 30 investment projects worth €4.5m, delivering €800,000 of savings on management costs and 800 tonnes of CO_2. The fund budget depends on the savings that will be made in the future.

The State's budget allocated to the VIRE fund was increased in 2012 to finance measures exceeding €375,000 and with a payback of over 10 years. €50m were earmarked for energy saving measures as part of the specific "Energie-Intracting" programme. This financing scheme for building renovation and energy retrofitting has been developed to finance energy investments representing at least 50% of the total amount invested, in addition to maintenance work, with a maximum payback of 20 years. Resulting savings on energy and management costs are returned to the fund to finance in-house measures.

"Energie-Intracting" at the University of Konstanz

The state's specific "Energie-Intracting" programme was launched to finance two energy retrofitting measures at the University of Konstanz. In August 2012, the University was allocated funding of €4.4m for the installation of a CHP unit and €1.7m for upgrading its district heating substations. The CHP unit covers all of the University's power needs and part of its heating requirements. It has a fuel energy efficiency of 90%, i.e. almost the double of conventional power generation units. The savings achieved made it possible to pay back the investment in 4 years. Thanks to the new substations, high energy-efficiency circulating pumps and remote management system, the University's buildings now use the heating from the district heating network more efficiently.

The above measures save 1,700 MWh of heating and 200 MWh of electricity a year, resulting in annual savings of €1.4m on energy costs and 1,040 tonnes of CO_2.

5.3.1 University of Heidelberg

Founded in 1386, the University of Heidelberg is the oldest university in Germany and is consistently ranked among Europe's top research universities. It is the third most important university for sciences and medicine after Munich and Berlin. The University has 30,000 students, employs 7,000 people and is composed of 12 faculties. The University has a €600m budget and the university hospital about 1 billion euros. From an institutional point of view, the University reports to the state of Bade-Württemberg's Ministry of Higher Education and Research and the university building stock is owned by the state's Ministry of Finance. The University, however, is totally independent from the state and the federal government. Public budgets will have to be balanced by 2020 and the University of Heidelberg is looking for ways to reduce expenses to compensate for the reduction in state financing.

Total energy costs reached €27m (€11.8m for the university and €15.7m for the hospital) in 2011. Electricity accounts for 52%, the cooling network for 8%, water 6% and heating 34%. In 2011, the net total area was 427,896 m^2 for the university and 466,948 m^2 for the hospital.

The University's building stock is managed at different levels: the State's Ministry of Finance and Economy owns the buildings, the State's Construction Directorate (Betriebsleitung Vermögen- und Bau) examines and validates the measures suggested and implemented by the University's Property Department. The Ministry's budget is fixed in advance, which means that any significant construction project has to be pre-budgeted. If additional renovation work is necessary, the University has to pay for it from its own funds.

In addition to the state's Energie-Intracting financing instrument described in the section on Konstanz University, the University of Heidelberg has also created an annual 100,000-euro fund to finance measures with a 4 to 7 year payback. These are small-scale measures such as the replacement of pumps, the installation of LED bulbs or the replacement of ventilation units, etc.

6. Conclusion

First introduced in Stuttgart in 1995, Intracting has been copied many times under different names. Intracting was first designed to finance small to medium-scale energy efficiency measures. The concept then evolved to finance larger-scale measures with longer paybacks.

To be used by universities and local authorities, Intracting requires a suitable environment, for example an energy department with qualified staff capable of carrying out missions requiring specific energy skills and knowledge in energy monitoring and control. By rethinking financing issues, the city or university will develop its own know-how – which is currently still too often outsourced - acquire better knowledge of its energy needs and become more independent in the choice of its equipment and use of its facilities. The university or city will thus become a true energy player, assume its function as a role model and help society progress toward energy transition

7. Bibliography

Studies (languages: French, English)

- Etude sur les fonds PICO de financement de travaux d'amélioration de la performance énergétique des bâtiments publics, ADEME, 2009

- PICO, managing and financing energy efficiency projects in public buildings trough public internal performance commitments, Wuppertal Institute and partners

City of Stuttgart (languages: German, English)

- "Stadtinternes Contracting - Finanzierungsinstrument zur Umsetzung von Maßnahmen zur Energie- und Wassereinsparung". Application to the 2011 municipal climate change competition ("Kommunaler Klimaschutz") organised by the German Ministry of the Environment http://edoc.difu.de/edoc.php?id=3UK6O4EM

- Energiebericht für das Jahr 2011 - Schriftenreihe des Amts für Umweltschutz – Heft 1/2012

- "Internal Contracting, the example of Stuttgart" Presentation http://vaxjo2013.energy-cities.eu/IMG/pdf/75_intracting_stuttgart_schaeffer.pdf

- *Intracting* agreement template of the city of Stuttgart

City of Lörrach (language: German)

- Energiebericht Lörrach 2011: http://www.loerrach.de/ceasy/modules/core/resources/main.php5?id=5403-0&download=1

- Intracting-Konzept für die Stadt Lörrach, 2009: http://www.google.fr/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&ved=0CC8QFjAA&url=http%3A%2F%2Fwww.loerrach.de%2Fceasy%2Fmodules%2Fcore%2Fresources%2Fmain.php5%3Fid%3D1315&ei=m7fKUaXPDMml0QWmnoEQ&usg=AFQjCNFyKvqEIQRQZW2ryz3gw7h5hSMv5Q&bvm=bv.48340889,d.d2k

- Abschlussbericht zum Projekt „Anschubfinanzierung für die Einführung des Intracting-Modells in der Stadt Lörrach", 2007: http://www.loerrach.de/ceasy/modules/core/resources/main.php5?id=1316

Land Bade-Württemberg (language: German)

- Klimaschutzkonzept 2020Plus, Land Baden-Württemberg: www.um.baden-wuerttemberg.de/servlet/is/103570/Klimaschutzkonzept_2020PLUS.pdf

- Pressemitteilung „Land startet Sonderprogramm zur energetischen Sanierung": http://www.baden-wuerttemberg.de/de/service/presse/pressemitteilung/pid/land-startet-sonderprogramm-fuer-energetische-sanierungen-an-landesgebaeuden/

- Stellungnahme des Ministeriums für Finanzen und Wirtschaft: Energetische Sanierung von Landesliegenschaften mittels Contracting-Verfahren: http://stober.bawue.spd.de/cgi-sub/fetch.php?id=177

Salix Finance Ltd (language: English)

- Salix Finance Ltd
  http://www.salixfinance.co.uk/energy-efficiency-recycling-funds

- Higher Education Funding Council for England *(*HEFCE*)*
  http://www.hefce.ac.uk/about/intro/fundinghighereducation/

8. Annexes

8.1 Agreement model

Agreement

No.

entered between the following parties:

the Energy department
and
the "client" department, namely
concerning
the provision of financial resources
for energy saving measures

1. Preamble
   The Energy department has been endowed with a municipal budget line to finance energy saving measures in municipal buildings. The objective is to achieve rapid implementation of these measures.

2. Location and description of the measures
   Location:

   Description:

3. Financing
   Total cost of the energy measure: € including VAT

   Upfront funding available %

   Match funding from the Energy department to the amount of **€** is therefore required.
   Funding requirement is justified by the appended calculations.

   The "client" department is responsible for checking whether match funding is required.

   Funding can only be granted in financial year .

   The "client" department will repay the energy department after implementation of the measure or in instalments.

4. Payback and cost-efficiency

The energy department estimates that the energy efficiency measures will deliver the following annual savings:

kWh	Heating (Gas, district heating, fuel oil)
kW	Power (Gas, district heating)
kWh	Electricity
kW	Electric power
m^3	Water
kg	CO_2 emissions

The detailed calculation is appended.

In total, **annual savings on energy costs are estimated at:**

€ (Heat)
€ (Water)
€ (Electricity) i.e., total savings of:
€

Based on these total annual savings, payback is years

Project cost-efficiency is calculated on the basis of the energy saving factor, a ratio based on the energy measure's lifetime.

$$\text{Energy saving factor} = \frac{\text{Lifetime [years]}}{\text{Payback [years]}} \times 100\%$$

The saving factor should be more than 100%. Considering a lifetime of years, the energy saving factor for the total amount is %.

5. Estimation of saved energy costs

Saved energy costs are estimated by multiplying energy savings by an average energy cost. The average energy cost is calculated on the basis of the buildings' previous year bill. Saved energy costs include VAT.

Saved energy costs are estimated by the energy department in agreement with the "client" department.

6. Implementation

The construction department supervises the implementation of the energy measures in agreement with the energy department and taking respective competencies into account.

7. Building use

The "client" department accepts the building use proposed by the energy department. Should financial savings be less than estimated, the payback period will be re-calculated as per section 4 of this agreement. The "client" department will report any change in building use to the energy department.

8. Return on investment

The return on investment corresponds to the amounts defined in this agreement.

As per sections 3 and 8 of this agreement, the payback period is of years.

$$\text{Return on investment} = \frac{\text{Invested capital}}{\text{Annual savings x saving factor}}$$

City, date	city, date
Energy department	"Client" department
.....	.....
Signature	Signature

8.2 Power Point Presentation

STUTTGART

Internal Contracting: the example of Stuttgart

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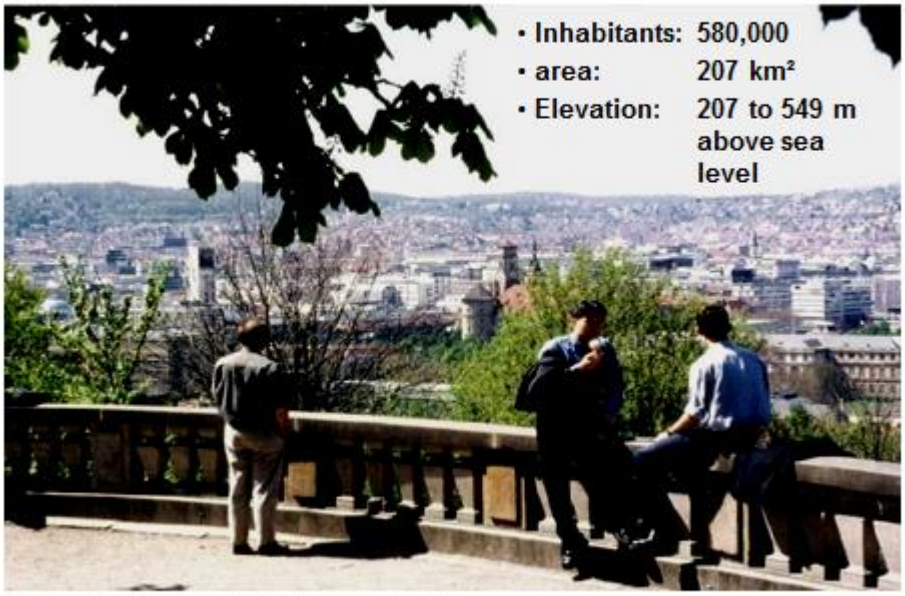

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Energy consumption of municipal buildings

In 2012

- 1,310 buildings = 2.2 million m² heated ground floor
- 188.500 MWh/a power = 33 Mio. Euro/a
- 286.133 MWh/a heat = 23 Mio. Euro/a
- 1.7 million m³/a water = 8 Mio. Euro/a
- 64 Mio. Euro/a

- Savings since 1977: 6,900 GWh
- Savings since 1990: 24 %

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Main tasks of the department of energy management

- surveying the energy and water consumption
- consulting the caretakers,technicians and departments
- purchasing energy and controlling supply
- research and demonstration projects
- developing guidelines
- change the behaviour of the users
- public relations

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Financial possibilities of energy saving measures

- classical financing within the annual budget
  - long term projects, i.e. reconstruction
- internal contracting
  - urgent projects
  - know-how available
  - co-financing
  - small projects
- external contracting
  - no money available in the municipality
  - no know-how in the municipality

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To Check before starting external contacting

- How much time/money takes the tendering process?
- Is the contractor‘s investment a black box?
- How do you deal with changes in the user profile?
- How much time takes the supervision?
- Can the customer define quality standards?
- Does the customer pay once or annually,

  when the contractor adjusts energy contracts?

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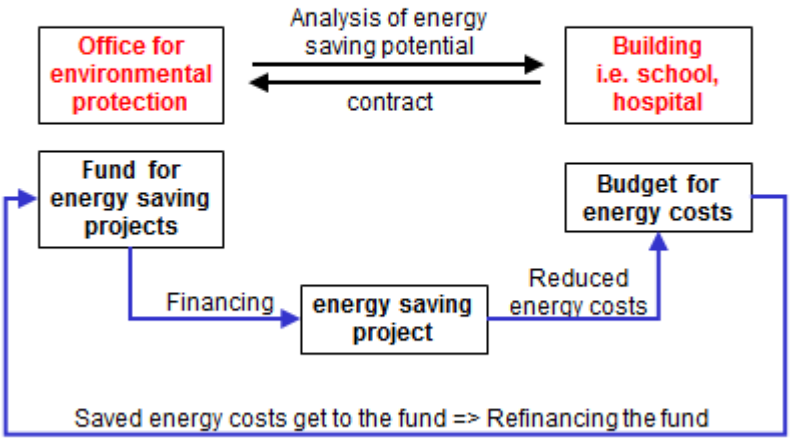
The principle of internal contracting



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Advantages of internal contracting

- quick response time
- no extra charges for risk
- no extra cost
- reduced necessity for quality control
- partial financing possible
- usable, if energy and investments depend on different budgets
- the municipality decides upon the investment in their facilities
  ===> Know-how remains in the municipality

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Examples for internal contracting

- Thermostats
- new controls for heating, ventilation or lighting
- renewal of lighting
- insulation of walls or top floors
- investment in water saving
- heat recovery systems
- street lighting
- combined heat and power plants
- renewable energy

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Thermal insulation of top floors

- Perfect for tiled roofs with big surfaces
- technically simple
- building physics: ok
- cheap

➔ do it yourself possible

➔ pay back time: 4.4 years

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Cover of outdoor or indoor pools

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Combined heat and power plants

- 35 - 52 kW electrical power
- 70 - 101 kW thermal power
- 91 - 99 % efficiency
- 254,000 kWh electricity/a
- 495,000 kWh heat/a
- 108,000 kg CO_2 - savings/a
- 16,000 € cost savings/a
- 90,000 € investment
- 6 years pay back

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Wood chips for heating – integral concept

- using municipal material ca. 18,000 m³/a
- reducing costs for disposal
- CO_2-reducing 1,845 t CO_2/a
- reducing energy costs 356,000 €/a
- investment 3.6 million €
- 2004 first firing in operation - now 4
- **pay back time: 10.7 years**
- **climate star 2004**

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Solar thermal plants

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Photovoltaic plants

- Free-standing facility
- area: 105 m²; rating: 12.6 kW_P
- Savings: 12,600 kWh/a; 8.7 t CO_2/a; 6,500 €/a
- investment: €94,900;
- payback period: 14.5 a

- Integrated into roofing
- area: 200 m²; rating: 12 kW_P
- savings: 8,800 kWh/a; 5.5 t CO_2/a; 4,300 €/a
- investment: €105,000;
- payback period: 24.8 a

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Rain water collection and usage

- roof surface 14,225 m²
- reservoir 350 m³
- savings 4,400 m³/a, 10,200 €/a
- Invest 222,000 €
- Pay back time 21.8 years

FIFA WORLD CUP GERMANY 2006

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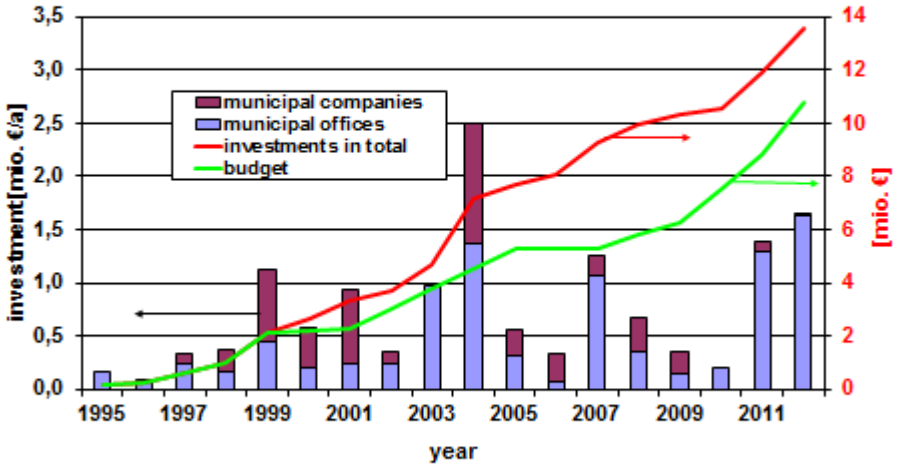
Investments



273 contracts fund: 8.8 Mio. € pay-back time: 7.4 years

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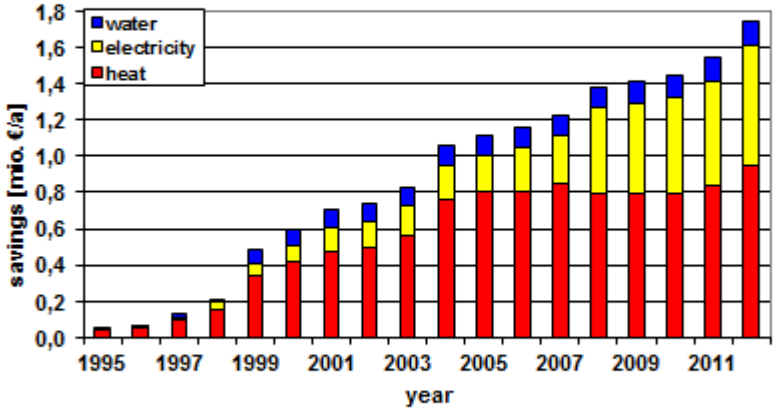
Cost savings



saved costs 15.9 Mio. Euro with an budget of 10.8 Mio. Euro

financial benefits until 2012: **5,1 Mio. Euro**

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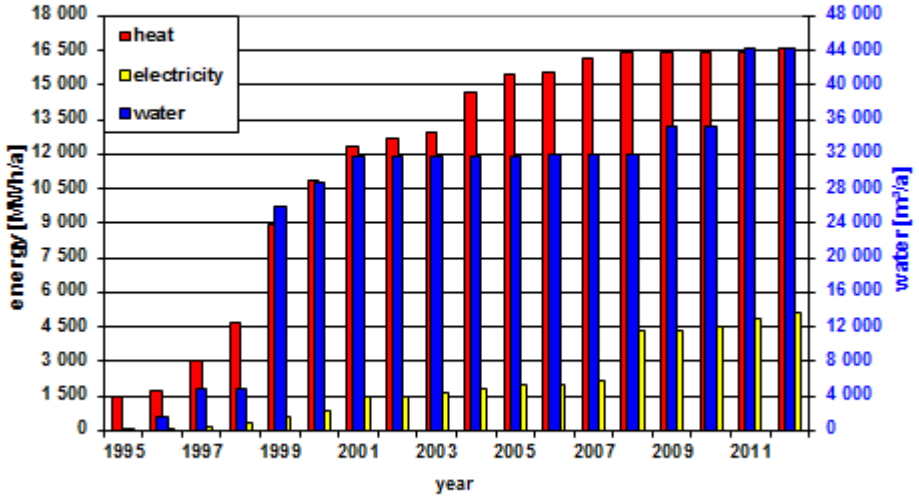
Energy and water saved



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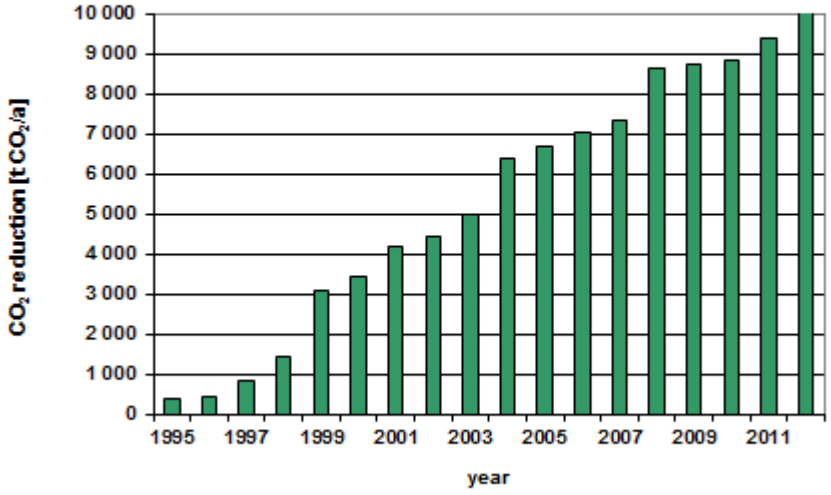
Reducing CO_2 emissions



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Intracting in Stuttgart in figures

Period 1995 – 2012:

- 292 « conventions » concluded
- Investment per project: from 5 000 € to 1,4 m€
- Payback time: 7,3 year (average)
- Initial Intracting fund: 2,5 m€
- Fund volume by end of 2011: 8,6 m€
- Investments (total): 10,8 m€
- Cost savings: 15,9 m€
- Benefits: 5,1 m€
- Reduction of CO_2 emissions: 10 000 t/a

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Intracting

Internal performance contracting

energycities

WHERE ACTION & VISION MEET