EVALUATION OF INITIAL ADVISORY SERVICE (IAS) FOR SMALL AND MEDIUM-SIZED ENTERPRISES IN NORTH RHINE-WESTPHALIA

WITHIN THE FRAMEWORK OF AID-EE PROJECT

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31 August 2006

Supported by Intelligent Energy Europe

Project executed within the Energy Intelligence for Europe programme, contract number EIE-2003-114

ECOFYS

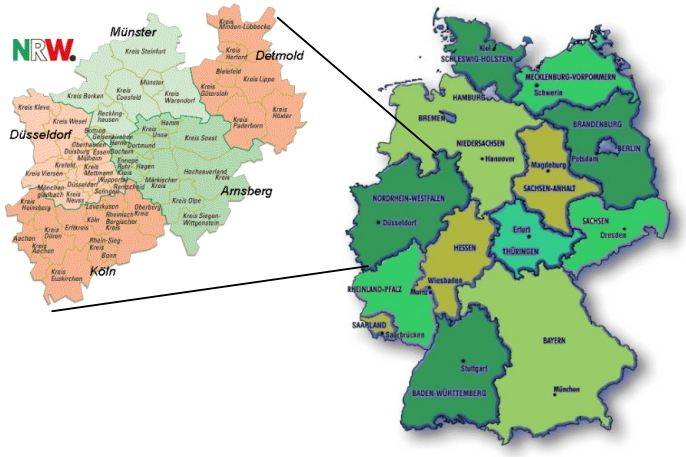
CONTENTS

1 Characterisation of the instrument

(1) Introduction

In the German federal state (Bundesland) of North Rhine-Westphalia (NRW), the producing and manufacting industry (incl. mining) is responsible for about 40% of energy use and 47% of CO_2 emissions. For this reason, the promotion of energy saving measures and efficient energy use have been explicit objectives of the federal state's government since many years. In the producing and manufacturing sector, the focus of the federal state's activities is especially on the promotion of advisory services at both the company and the sectoral level as well as on the promotion of training programmes. Besides the development of energy concepts in the trade and industry sector (ECTIS; cf. the other AID-EE case study in NRW), a main policy instrument addressing small and medium-sized enterprises (SMEs) in NRW is an initial advisory service (IAS). This instrument has been offered by the energy agency of NRW since 1990.

Table 1: Map of North Rhine-Westphalia



(2) Targets and period of applying the policy instrument

a) Targets of the instrument

As for the Energy Concepts for Trade and Industry Sectors (ECTIS), only very general and qualitative targets have explicitly been mentionedfor the instrument, such as

- the sensitising of enterprises for questions of energy use and energy efficiency,
- the provision of information on innovative technologies and process opotimisations,
- the contribution to the reduction of energy use and CO_2-emissions in the business sector, and
- the improvement of international competitiveness of NRW-based industries.

IAS are a continuously offered "*stand-by service*", in which brief advice is offered to interested companies by the Energy Agency of NRW (EA-NRW)[1], including personal on-site advice.

b) Share of energy use and emissions affected by the instrument

The two figures below show the share of the energy use and emissions of the manufaturing industry in NRW.

In the year 2000, the manufacturing industry with about 838 000 TJ held a share of 40% of energy consumption. About one quarter of energy use was caused by transportation (26% or 549 000 TJ). The household sector and the trade and service sector together held a share of about one third (34% or 708 000 TJ).
In terms of CO_2-emissions, the manufacturing industry emitted about 47% of emissions in NRW. The household sector, the trade and service sector and the transport sector were each responsible for a share between 16% (trade and service sector) and 18% (private households).

[1] EA-NRW receiveds full public funding by the federal state of NRW in order to provide advisory services (for SMEs and public buildings, private house owners), to manage federal state's projects or campaigns on energy efficiency or to conduct education programmes and public relations. EA-NRW is located in Wuppertal.

Figure 1: Final energy Use in NRW (2000, in TJ)

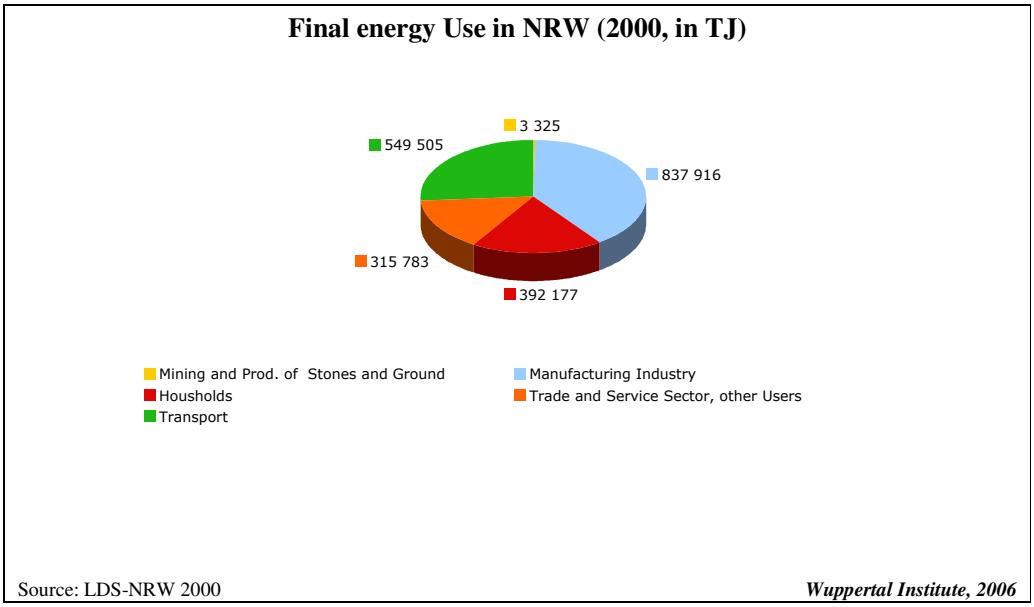
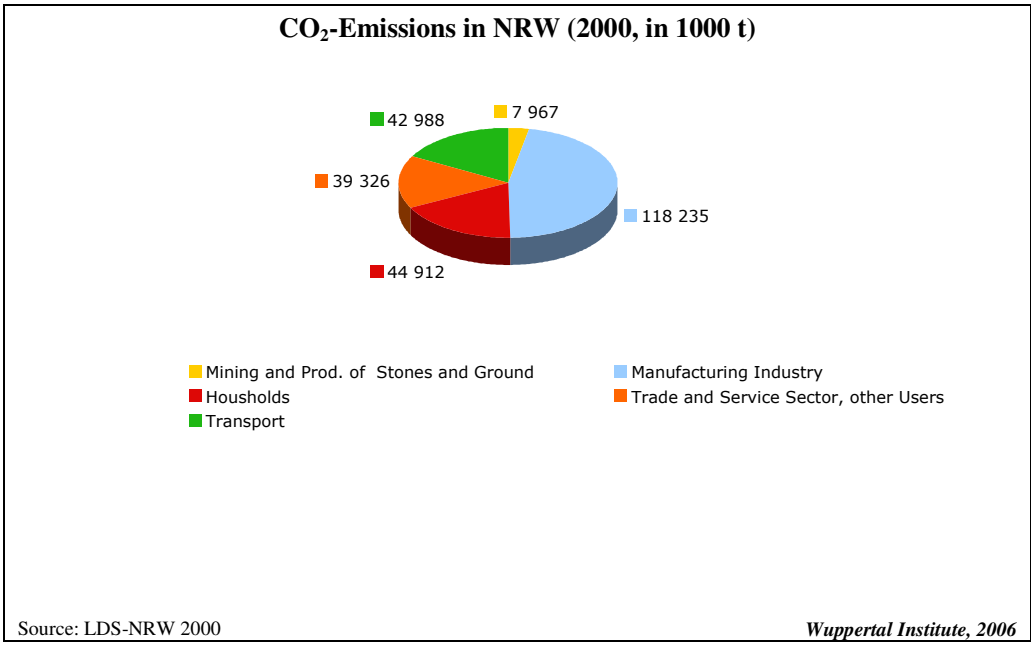


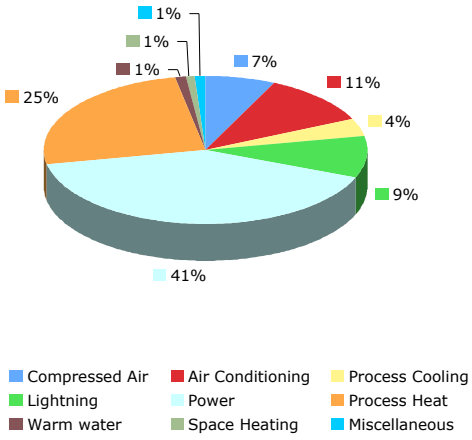
Figure 2: CO_2-Emissions in NRW (2000, in 1000 t)



The structure of electricity use in the industry sector in Germany shows a very differentiated image: While process heat (25%) and power provision (41%) need the largest share of energy, also lightning (9%), air conditionning (11%), cooling (4%), and the provision of compressed air (7%) hold a remarkable share.

Figure 3: Structure of electricity use of the industry sector in Germany in the year 2003 (Sum = 210 TWh/year)

Structure of electricity use of the industry sector in Germany in the year 2003



Source: Wuppertal Institute 2006 *Wuppertal Institute, 2006*

c) Reduction potentials in the related sectors

The estimation of the reduction potentials for energy use and emissions vary due to different technical and economic conditions. The Climate Action Plan of the state of NRW (NRW 2000: 93) assumed a 10% share of energy use and emissions to be easily reduced through measures targeting at the provision of information and the implementation of low cost measures, equivalent to 6,19 Mio. t CO_2 in the sectors covered by ECTIS.

There have been carried out several studies addressing the technical and economic reduction potentials for the industry sector in Germany (e.g. ISI 2003, Wuppertal Institute 2006). Calculating the effects of 70 technologies and measures, In its study for the E.On AG, the Wuppertal Institute calculated reduction potentials in energy

use and a CO_2 emissions for the year 2010 and 2015 for all sectors Germany. For the entire industry sector, a reduction potential of about 25% of energy use and CO_2 emissions was calculated, as the two following figures show.

Figure 4: Dynamic and static potentials in net electricity use

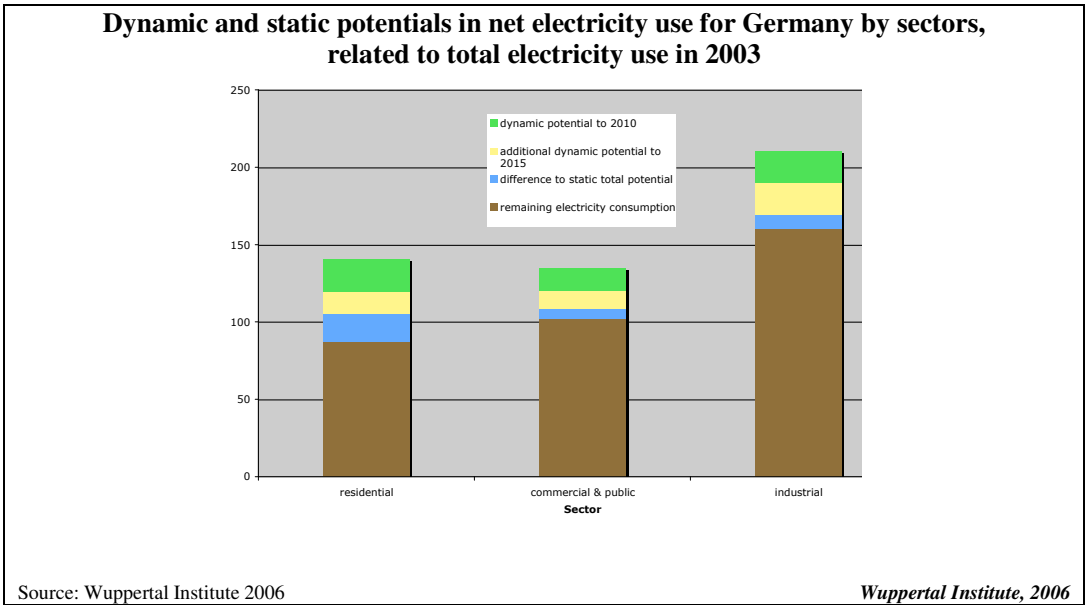
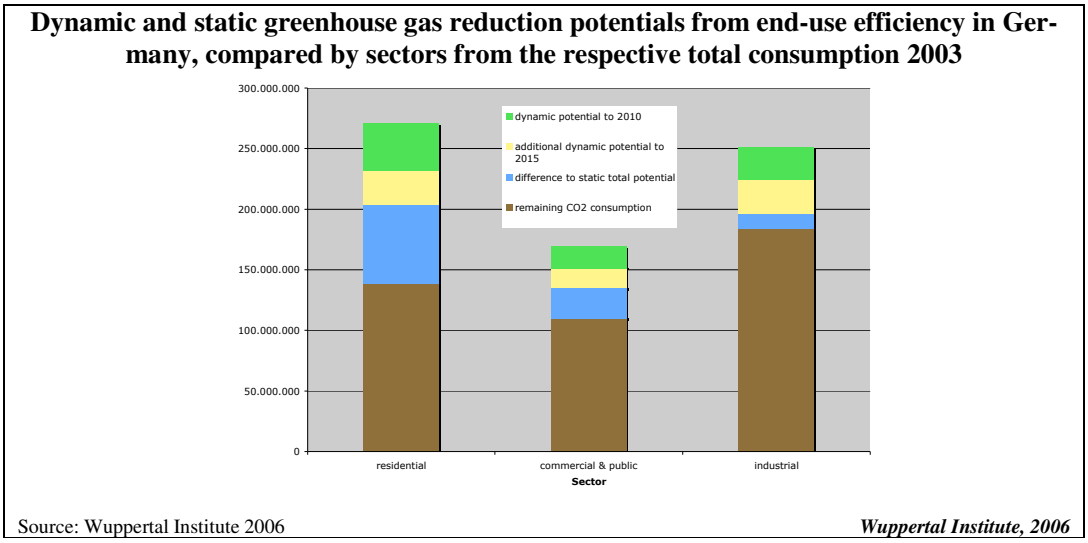


Figure 5: Dynamic and static greenhouse gas reduction potentials



(3) Target groups, end use, specific technologies or energy efficiency measures

The instrument focuses on small and medium-sized enterprises in the production, manufacturing and service sector, since such companies are assumed to have limited internal competence, capacities or resources for energy-related questions. With regard to the envisaged target groups, however, no specification of sectoral priorities have been made.

IAS do not promote special technologies, products or process innovations. Instead, the advisory process focuses on the optimisation of production processes and cross-cutting technologies at the company level.

Typical recommendations include, for example, the optimisation of the provision of compressed air and of cooling or heating energy, the refurbishment of lighting of illumination systems and the reduction of energy losses in boilers. Other measures and recommendations target at the introduction of renewable energies.

(4) National and federal state context

a) National context of climate policy

Already in the 1980s, Germany started to establish its own profile in national climate policy. During the government of the Social-Democratic and the Green Party coalition between 1998 and 2005, national climate policy covered the following core elements:

(1) *Ecological Tax*: The Ecological Tax reform was introduced in 1999, imposing taxes on energy use in the industry, public private households and transportation sectors with the objective of reducing non-wage labour costs, of financing promotion programmes for renewable energies and modernisations in old buildings, and of consolidating national finances (since 2003).

(2) *Promotion of Combined Heat and Power (CHP)*. In the federal climate protection programme of 2000, the promotion of CHP was planned by quotas. The CHP-act of 2002, however, promotes CHP by a specific feed-in tariff for electricity.

(3) *Promotion of Renewables*: Loan programmes (e.g. for solar heating, biomass and photovoltaic, geothermal power), feed-in tariffs for all electricity production based on renewable energies and grants (e.g. biomass power plants) have been instruments to promote renewable energies also in the business sector. Especially the Renewable Energy Act, adopted in 2000 and reissued in 2004, has played a major role in this context.

(4) *Energy Saving in Buildings*: The German government promotes a higher level of energy efficiency in the building sector by an energy saving ordinance for new and existing buildings – this ordinance sets relatively high technical standards particularly for the construction of new buildings – and a credit-based soft loan CO_2-reduction programme for energy-efficient modernisation of old buildings. Between 2000 and 2003, the volume of the programme was about 600 Mio. Euros per year.

(5) *Phase-out of Nuclear Energy*: In 2002, the government and large electricity utilities agreed on the phase-out of nuclear energy in Germany at the latest by 2025.

(6) *Voluntary Agreement between the German Government and the German Industry*: Until the start of the European emissions trading scheme in 2005, climate policy in the energy and industry sector was regulated by voluntary agreements with the federal government (1995/96 and 2000). These agreements covered commitments for specific reductions at the installation level, the broader installation of CHPs and fuel cell-technology, the diffusion of renewable energies and the realisation of energy efficiency campaigns.

(7) *EU – Emissions Trading Scheme*: Since 2005, there has been established the European Emissions Trading Scheme. Designed as a so called cap-and-trade-system, the scheme covers large installations (> 20 MW) in the energy and industry sector. 50% of all German emissions allowances are allocated to installations in NRW.

(8) *Research:* In addition to sector- or technologiy-specific instruments, the German Ministries of Education and Research, Environment and Economic Affairs each issued own research programmes targeting on the development of energy-efficient technologies or improvement of regenerative energies, as the research programm on the promotion and development of renewable energies (MoE, since 1996) and programme on energy research (Minsistry of Economic Affairs)

Until now, in principle, these elements have been retained after the federal election in 2005.

b) Climate policy at the federal state level

While instruments at the national and EU-level also affect energy use on the federal state level, NRW initiated a broad spectrum of additional cross-sectoral activities to reduce greenhouse gas emissions (MWMEV 2001; MWME 2005).

(1) *The Federal State Initiative for Future Energies* (Landesinitiative Zukunftsenergien) aims at promoting innovation processes in NRW by enforcing co-operations and strategic alliances between the business sector and policy-makers, and at accelerating the launch of innovative products. More than 3.000 experts work in 19 relevant working groups and *competence networks* e.g. in the field of building construction, fuel cells, CHP, solar heating, hydro power and energy services. Also the development of ECTIS started in a working group within the initiative in 1996.

(2) *Energy Research*: NRW supports energy research projects e.g. in the field of solar residential areas, fuel cells or power plant technologies (MWME 2005). In order to initiate research projects in related fields, so called *competence networks* have been established.

(3) *Rational Energy Use and Use of Inexhaustible Energy Sources (REN-Programme):* Established in the early 1990s, the REN-programme has especially promoted renewable energies at the level of R&D and demonstration projects as well as at the level of the mass diffusion of mature technologies. By now (2006), more than 51.000 projects with a financial volume of 640 Mio. € have been funded.

(4) *Energy Agency NRW (EA-NRW):* The state of NRW finances a large energy agency in order to support SMEs and local communities in their activities related to energy efficiency. The EA-NRW co-ordinates a range of initiatives, such as the REN-impulse programmes "*Construction and Energy*" and "*RAVEL"* (a training and seminar programme on energy efficiency for practitioners). Moreover, EA-NRW offers cost-free initial advice for SMEs[2] and public entities. Additionally, it promotes energy efficient activities in schools and public buildings and provides advice for private tertiary buildings.

(5) *Efficiency Agency* NRW: The efficiency agency offers advice for SMEs in all fields of environmental protection (waste management, waste water, energy). In the field of energy efificiency, the efficiency agency closely co-operates with the EA-NRW.

[2] See the second NRW-study of the Wuppertal Institute within the Aid-EE project which evaluates the Initial Advisory Service for SMEs.

(6) *Energy Consultancy by Consumer Advice Centres:* Funded by the federal state and local authorities, the Consumer Advice Centre (Verbraucherzentrale) in NRW offers a low-cost energy consultancy for house owners in eleven local communities and cities in NRW.

(7) *Action Programme 2000plus*: Within this programme, especially local communities and administrations are addressed by offering continuous regional meetings, the provision of online information tools and the co-ordination of EU-projects ("Communal Labels" and "European Energy Award").

The conceptual framework for these measures is provided by the Climate Policy Plan of the federal state of NRW (NRW 2005). In 2005, an implementation report was published aiming at estimating the reduction effects of each instrument mentioned above (MWME 2005)

(5) Market failures to overcome

The market failures explicitly addressed by ECTIS are an assumed lack of capacities on energy issues and informational deficits in SMEs. The prior assumption of the overall instrument is that companies of one sector have typical energetic *weak points* in both production processes and cross-cutting technologies, and therefore similar cost-efficient potentials for reductions in energy use. Besides the deficits in information and capacity, there are also other market failures being an obstacle for the implementation of energy-efficient measures in the business sector as, for example

- a low share of energy costs in total costs,
- low cost-efficiency of some energy saving measures
- use of financial resources for other, more important investments, e.g. in the production process, in quality etc.
- aspects of risks in investments of efficiency technologies (payback period, assumptions about profitability),
- splitted incentives (who profits from investments in energy efficiency measures?; See also Irrek 2004, Drillisch 1996, IEA 2000; Nilsson and Wene 2002)

(6) Actions included in the instrument

The spectrum of actions included in the instrument are
a) public relations for energy efficient measures and the service offered by EA-NRW,
b) continuous installation of a hotline for first contacts and first advice, analysis of energy-relevant data in companies interested in more detailed advice, usually basing on a standardised questionnaire,
c) on-the-spot inspection of the company to address short-term and low cost measures (e.g. organisational changes) and finally
d) the documentation and synthesis of recommendations in a report.

IAS in companies can point at two grant programmes. On the one hand, the federal *KfW-Förderbank* (promotional bank) offers low-interest loans for investments in energy-efficient technologies. The federal state of NRW, on the other hand, promotes the development of energy concepts at the company level, conducted by private consultants with a grant at 50%.

(7) Organisations, which are responsible for implementation and execution

Assigned by the NRW-Ministry for Economy, SMEs and Energy (formerly: Ministry for Transport, Energy and State Planning), the organisation in charge for the implementation and execution of the instrument is the Energy Agency of North-Rhine-Westphalia (EA-NRW). Founded in 1990, the energy agency is located in Wuppertal and Duisburg. EA-NRW is a publicly-funded institution that provides neutral and independent services to municipalities, firms and other public and private bodies. The services being offered range from the provision of information, advise and training programmes on energy efficiency issues up to the promotion of business cooperation and assistance for the introduction of new products. EA-NRW is also involved in international projects.

Although there are continuous meetings between the Ministry and EA-NRW, there has been no additional organisational structure or board established which is related to the instrument.

(8) Available budget

There is no comprehensive financial budget plan available for the instrument. An evaluation made in 1999 (SFZ 1999: 166) estimated the gross costs of one service conducted by EA-NRW to ca. 1.300 € in Wuppertal (main site of the EA) and ca. 2.000 € in a branch office in Duisburg.[3]

Currently (2006), eight consulting engineers (6 in Wuppertal, 2 in Duisburg) are involved. However, these eight consultants do not offer only IAS to small and medium enterprises, but also comparable services for local authorities and public institutions (e.g schools, public buildings).
The table below shows the invested resources for the provided personnel.[4]

Table 2: Invested resources (personnel)

Year	Number of IAS/year	Average hours for one advice	Sum of invested hours	Working days
2002	368	12	4 416	552
2003	405	12	4 860	607
2004	457	12	5 484	685
2005	440	12	5 280	660

Source: EA-NRW *Wuppertal Institute, 2006*

The number of working days is equivalent to three full-time employed advisors.
The recent annual report of the EA-NRW (EA-NRW 2005: 13) shows that 55,2% of energy advices were demanded by companies. Other users of services are public institutions, multiplyers, stakeholders and house-owners.
To roughly assess the overall budget invested in the instrument, the following calculation will be made: the average gross personnel costs for a consulting engineer are about 75.000 € per annum, working 220 days a year.

As a result, three consulting engineers with **225 000€** gross costs a year are financed to continuously provide the service. Divided through 440 services conducted in 2005, the costs for one advice is about **500€**.

Table 3: Invested financial resources in 2005 (contradiction to table 4)

Working days invested in IAS 2005	No. of EA consultants hold out for the service	Gross Costs for IAS in 2005 (75.000€/consultant/a)	Gross costs per services conducted by EA-NRW

[3] The different cost structure in both sites are caused by different types of services. While in Wuppertal also other services and departments of the energy agency are located, in Duisburg only advisory services for companies and public buildings are offered.

[4] This calculation includes only the IAS provided for SMEs. Not included are resources for advice on the phone, presentations at workshops, networking etc. (Int. 01/05)

	(220 working days/a)		(440 in 2005)
660	3	225 000€	511€

Source: own calculation *Wuppertal Institute, 2006*

(9) Available information on initially expected effectiveness and cost-efficiency of the instrument, products

There is no information available on the initially expected effectiveness or cost-efficiency of the instrument.

(10) Side effects

By now, there also have been no side effects systematically analysed. As in Energy Concepts for Trade and Industry Sectors (ECTIS), however, possible positive side-effects of the instrument are seen in the the improvement of working conditions in companies, the improvement of the overall efficiency and quality of production.

(11) Further development

Since energy prices had risen dramatically in 2005, an increased demand for energy-related services can be observed. In the near future, this demand is expected to rise, especially in the business sector. For this reason, the new conservative-liberal government decided to continue this advice for the coming future (Int . 01/05). However there are institutional risks whether EA-NRW and its services can be secured in the long term.

2 Policy theory

2.1 Cause-impact relations

The instrument's prior assumptions and the intended cause-impact relations are as follows: assuming large potentials for energy-efficiency in enterprises in North Rhine-Westphalia, weiter???

(1.) Small and medium-sized enterprises (SME) are assumed to possess either no adequate resources or competences to manage issues on energy efficiency and energy saving.

(2.) A cost-free initial advice is offered by EA-NRW in order to address this competence and awareness gap within companies.

(3.) Systematic advertising by means of public relations, newsletters, a web-site and advertising at workshops or events enables direct contacts to interested companies.

(4.) If companies are interested in a more detailed advice, EA-NRW starts gathering energy-related information of the company and conducts a cost-free on-the-spot inspection. The data is usually generated by a standardised questionnaire.

(5.) The report on this process points out energetic weak spots and includes recommendations to increase the energy efficiency in advised companies.

(6.) Advised companies are expected to implement recommended measures, or to make use of detailed follow-up analysis by a commercial consultant.

(7.) Adviced companies are assumed to advertise the instrument also to other firms of the related sector (snowballl-effect)

2.2 Interaction with other policies

There are especially two complementary instruments offered by the federal state of NRW. While energy concepts for industry and trade sectors (ECTIS) have been one of the core instruments of the *NRW Landesinitiative Zukunftsenergien* (State Initiative for Future Technologies)[5], the development of Energy Concepts at the company level is supported as well. Between 1995 and 2004, about 90 energy concepts have been funded. As in the consultancy process within the sectoral concepts, however, only 50% of the costs are covered by the ministry. In difference to the Initial Advisory Service these concepts are developed by independent commercial engineers and private engineering companies.

At the federal level, on the other hand, the federal energy agency (Deutsche Energieagentur, *dena*) currently co-ordinates a large public campaign on energy efficiency in the business sector ("*Initiative Energieeffizienz*"; Initiative on Energy Efficiency). Funded by the German Ministry of Economics and large German energy utilities and predominantly focusing on cross-cutting technologies, the campaign pursues similar targets as the IAS in NRW. However, *Initiative Energieeffizienz* explicitly focuses on end-energy use of cross-cutting technologies. EA-NRW is cooperating with this initiative, since *dena* has only very limited resources to offer cost-free initial advisory services.

Complementary to initial advices offered by EA-NRW the federal government offers a credit-based loan programme for investments in energy efficient technologies through the KfW-Förderbank (promotional bank): Within a broader environmental and energy-saving programme, low interest credits for energy efficiency measures and renewables are offerd for SMEs. EA-NRW advisers can refer to these funding opportunities.

[5] See related evaluation of the instrument in the AID-EE project (Schüle 2006).

2.3 Indicators and methods

In order to evaluate the effects of the instrument, the indicators mentioned below will be applied. Regarding the availability of data, however, the information basis for the evaluation has been rather limited. Relevant information could only be drawn from four sources: face-to-face interviews, the data bank of the EA-NRW, an evaluation of the instrument conducted in 1999 (SFZ 1999), and a small survey carried out in companies of the metal and chemical sector.

1. Concept and Management

- Indicator 1.1: Coherence of the concept,
- Indicator 1.2: Adequacy of management

2. Envisaged Target Groups

- Indicator 2.1: Reaching of target groups
- Indicator 2.2: Distribution of IAS within sectors

In order to estimate the recognition of the instrument, a survey has been conducted in companies in the metal and chemical industry in April 2006 (n=50) by the Wuppertal Institute and the ifeu-Institute.

3. Awareness of Institution and Instrument

- Indicator 3.1: Awareness of EA-NRW
- Indicator 3.2: Awarreness of services of EA-NRW
- Indicator 3.3: Acceptance of EA-NRW and provided services

The quality of the IAS can only be documented on the basis of the survey mentioned above (n=50) and 10 additional interviews that have been conducted with companies who have already received an IAS.

4. Quality of Advice and Effects in Companies

- Indicator 4.1: Assessment of the quality of the advice
- Indicator 4.2: Implemented recommendations and effects in emission reductions

2.4 Success and failure factors

The following success and failure factors influence the success of the instrument. The factos can be distinguished into factors within a company, factors related to the activities of the EA-NRW and factors related to general framework conditions.

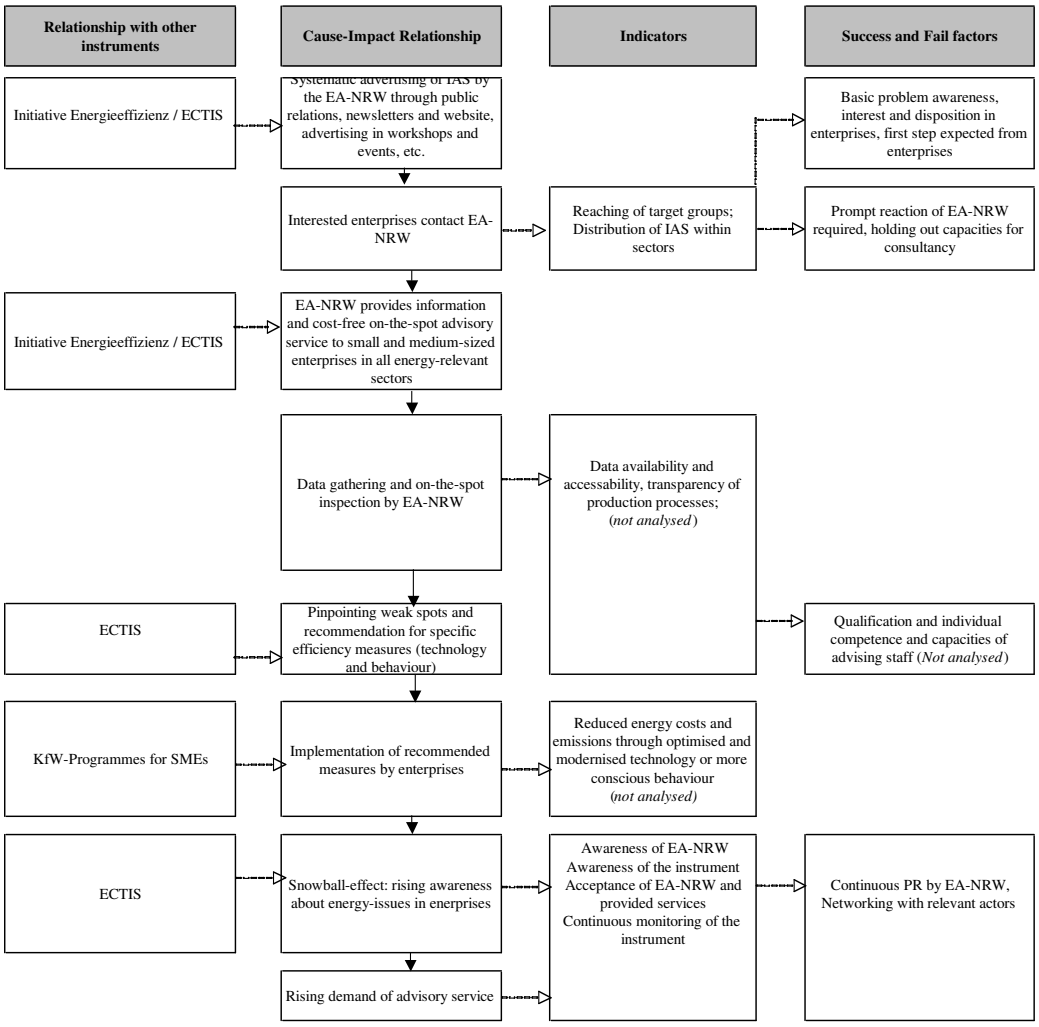
(1) As regards factors related to the demand-side of the service, the IAS requires (and presupposes) a basic problem awareness and initial initiative of potential demanders. Several framework conditions structure the problem awareness of companies and sectoral associations related to energy use and energy efficiency. Cultural, managerial and organisational aspects within companies, for example, structure the problem awareness as do external conditions, the level of energy prices, the stability of economic conditions, etc.

(2) As regards the supply-side of the service, the instrument requires a continuous advertisement through the supplier, the EA-NRW. Envisaged target groups have to be continuously informed by internet, public relations, workshops and events, journals, multipliers, trusted organisations and key persons. If an interested company initially contacts the EA-NRW to request advice, a prompt reaction is required. For this reason, EA-NRW needs to hold a sufficient number of personnel and energy advisers in readiness. Finally, a satisfying monitoring scheme is required in order to secure the quality assurance of the services and to enable further improvements of the instrument. Which measures have been implemented in advised companies? What was the specific contribution of the IAS when companies implemented measures to increase their energy efficiency?

Other success factors are:

- sufficient know-how of the consultants,
- networking with other institutions and related activities (chambers, sector associations, etc.),
- internal consensus on measures within companies, and
- positive recommendations and experience provided by other companies.

Table 4 Overall picture of relationships based upon policy theor



3 Evaluation

3.1 Concept and Management

Indicator 1.1/ 1.2: Coherence of the concept and adequacy of management
IAS is a stand-by service for interested companies from all industry and service sectors in NRW. The instrument offers a standardised package of elements, including data generation, on-the-spot inspection and reporting. To continuously offer this service, three advisors have been held ready by EA-NRW. The *advantage* of such a structure of the instrument are low transaction costs, a high level of standardisation of advice and service and, finally, low efforts to manage the instrument. However, such an approach bears also noticable disadvantages:

- **Inflexibility**: Irrespective of the sectoral affiliation of a company, the absolute or relative level of energy use and emissions and irespective of economic indicators, for each type of company the same "package" is being offered by EA-NRW, including an on-site-inspection.
- **Indifference**: As regards to target groups, the instrument is indifferent. No emphasis in terms of sector, technology or type of company has been defined yet.
- **Direct Contact**: The service has been based on the initial initiative of interested companies. Although EA-NRW conducts PR and advertisement for the instrument, a direct approach and acquisition of firms has not been attempted yet.

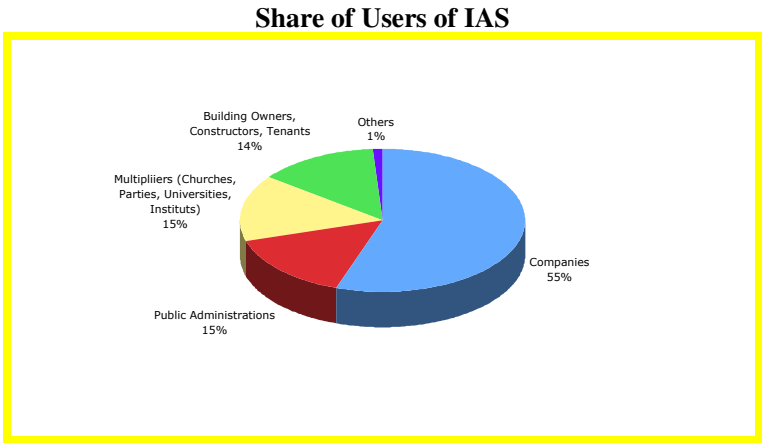
By now, there no adequate system of service-related monitoring has been established, neither with regard to the structure of demand (Which sectors? What needs of target groups?) nor with regard to the effects of the instrument.

3.2 Envisaged target groups

Indicator 2.1: Reaching of target groups

Initial advisory services for SMEs are only one service offered by EA-NRW. In 2004, for example, the institution conducted a total of 1001 initial advices also for institutions and stakeholders, such as multipliers, house owners, and public administrations (see figure below).

Figure 6: Share of uses of IAS



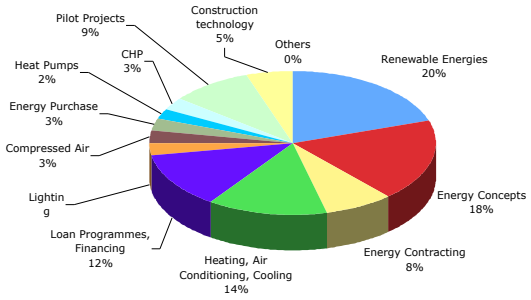
Source: EA-NRW 2004 *Wuppertal Institute, 2006*

More than half of the services conducted by EA-NRW are performed for companies. The needs of interested companies to use the EA-NRW's services are as follows: About one fifth of conducted energy advices focused on the development of energy concepts at the company level (18,4%). Heating, cooling and air-conditioning were addressed in 13,8% of all advices as well as promotion programmes and financing (12,3%). The most important need for advice was on the use of renewable energies (especially biomass, solar heating, PV). Additionally, EA-NRW conducted 7.416 short advices by phone, mail or in a mobile advisory office in 2004.

Between 2002 and 2005, 418 IAS were conducted on an average per year. While the usage of the service increased between 2002 and 2004, it decreased marginally between 2004 and 2005.

Figure 7: Share of demanded issues

Share of demanded issues in IAS (all users)



Source: EA-NRW 2004 *Wuppertal Institute, 2006*

As regards the usage of IAS in the preceding years, the EA-NRW experienced an (almost) constant rise, with the exception of 2005, in which the usage decreased slightly compared to 2004.

Table 5: Reached companies

Year	2002	2003	2004	2005
No. of reached companies	368	405	457	440

Source: EA-NRW 2006 *Wuppertal Institute, 2006*

Indicator 2.2: Distribution of IAS within sectors[6]

In terms of distribution of IAS within sectors the following structure can be recognised: Related to the number of companies in NRW (2000) and conducted IAS, discrepancies in the following sectors can be observed:

- There has been a disproportionately higher request for IAS in the wood processing industry, car producing industry and hotels.
- On the other hand, there has been requested disproportionately lower request for IAS in the nutrition, plastics, glass and ceramics and engine construction sectors. A reason for this disproportion might be due to the fact

[6] The table does only include a random sample of 276 IAS (of 897 conducted in 2004 and 2005)

that especially the energy-intensive industries have already a specific awareness of energy matters.

Table 6: Distribution of IAS within sectors

Sector	No. of SME in NRW (2000)	%	Number of IAS (2004 and 2005)	%
Nutrition Industry	1043,00	12,51	21,00	7,61
Textile Industry	366,00	4,39	12,00	4,35
Wood Machining and Processing	271,00	3,25	35,00	12,68
Chemical Industry	460,00	5,52	10,00	3,62
Plastics Industy	728,00	8,73	12,00	4,35
Glass and Ceramics	584,00	7,00	10,00	3,62
Concrete and Brick Production	200,00	2,40	4,00	1,45
Metal Production and Processing	2476,00	29,69	87,00	31,52
Engine Construction	1672,00	20,05	13,00	4,71
Car Producing Industry	283,00	3,39	28,00	10,14
Car Dealers	51,00	0,61	6,00	2,17
Hotels	58,00	0,70	25,00	9,06
Horticulture	147,00	1,76	13,00	4,71
Total	**8339,00**	100,00	**276,00**	100,00

3.3 Awareness of the responsible institution and the instrument

The Wuppertal Institute and the Ifeu-Institute conducted a survey in April 2004 on the knowledge about and the use of advisory programmes that are being funded by the federal state of North-Rhine Westphalia. About 500 SMEs from the chemical and the metal industry in NRW have been selected at random from publicly available address lists of the Chambers of Commerce and Industry districts of Düsseldorf, Siegen and Aachen.[7]

Introduction: State of implementation of energy efficient measures in enterprises

Two questions of the survey addressed the state of implementation of energy efficient measures and the use of external advisory services.

[7] The description of the methodology and the number of contacted companies can be found in Annex 6.1

Table 7: Has your company undertaken any measures related to energetic optimisation of the production or manufacturing process or with regard to cross-cutting technologies in the last years?

Answers	Chemical sector	Metal sector	Total
Yes	9	17	26
No	11	13	24

Source: Interview Survey *Wuppertal Institute, 2006*

About half of the interviewed enterprises each have already implemented measures towards an energetic optimisation of the production or manufacturing process or with regard to cross-cutting technologies in the last years.

Table 8: Did you make use of one or more external advisory services for these measures

Answers	Chemical sector	Metal sector	Total
Yes	5	10	15
No	15	20	35

Source: Interview Survey *Wuppertal Institute, 2006*

Of the 26 companies that have undertaken measures to save energy, half of the interviewed enterprises from the metal sector and a third of those from the chemical sector made use of external consultancy services. These were conducted by the following institutions:

Table 9: Advisory services conducted by institution[8]

Answers	Chemical sector	Metal sector	Total
Energy agency NRW	1	1	2
Consulting engineers	3	7	10
Architects	0	2	2
Ecoprofit	0	2	2
Energy utilities	0	1	1
Not specified	7	1	8
Total	**12**	**14**	**26**

Source: Interview Survey *Wuppertal Institute, 2006*

[8] Multiple answers were possible.

Indicator 3.1: Awareness of EA-NRW

Within the survey conducted by Wupperal Institute and ifeu (n=50), companies in the metal and chemical industry were asked whom or which institution they contacted if they would have realised a need for external consultancy (Question 3).

Table 10: Whom would you contact if you would have realised a need for an external consultancy?

Sector / Given answers	Chemical sector	Metal sector
Sector association	2	4
Chambers of Commerce and Industry	1	2
Energy utilities	6	7
Private consulting engineer	5	6
Local authorities (e.g. environmental agency, business development agency)	1	0
Ministry of the federal state	0	1
Other private or public institutions	4	8
Total answers	**19**	**24**
Not specified or "do not know"	7	11

Source: Interview Survey *Wuppertal Institute, 2006*

The list of possible answers was open in the sense that the interviewed persons in the companies could add further institutions. Among the answers offered to the interviewed, EA-NRW was explicitly not mentioned. However, EA-NRW was mentioned eight times in the category "other private or public institutions"
Most likely, the respondents would approach energy utilities (13). Expertise regarding private energy consultancy is also being ascribed to private consulting engineers (11).

Indicator 3.2: Awareness of services of EA-NRW

The subsequent question (Question 4) addressed the awareness about the energy advice services of EA-NRW.
About 20% of respondents (n=10) knew about the advisory services. These interviewees were questioned further which public authority consultancy services they know of:

- Initial advisory service: two companies from the chemical sector and four from the metal sector mentioned this instrument.
- Energy concept for SMEs: This was known by one company from the chemical industry.
- Energy Concepts for Trade and Industry ("Branchenenergiekonzept") were mentioned once by a metal company. This company even took part in the development of its sectoral concept.

Table 11: Do you know about the advisory services of the energy agency for small and medium-sized enterprises?

Sectors / Answers	Chemical sector	Metal sector	Total
Yes	4	6	10
No	16	24	40

Source: Interview Survey *Wuppertal Institute, 2006*

The subsequent question 5 addressed the specific knowledge of the interviewees about IAS:

Table 12: Do you know about IAS offered by EA-NRW?

Sectors / Answers	Chemical sector	Metal sector	Total
Yes	2	7	9
No	18	23	41

Source: Interview Survey *Wuppertal Institute, 2006*

18% of respondents knew about the IAS of the energy agency of North Rhine-Westphalia. Further inquiries with those that knew the instrument regarding the information lead to the following result: 7 respondents were familiar with the spectrum of the IAS, 2 enterprises have just heard of the term.

One company from the chemical sector and three companies from the metal sector have made use of the initial free-of-charge consultancy service.

Indicator 3.3: Acceptance of EA-NRW and provided services

A concluding question addressed the acceptance of the energy agency and its provided services.

Table 13: Would you address the energy agency if you thought you needed external consultancy?

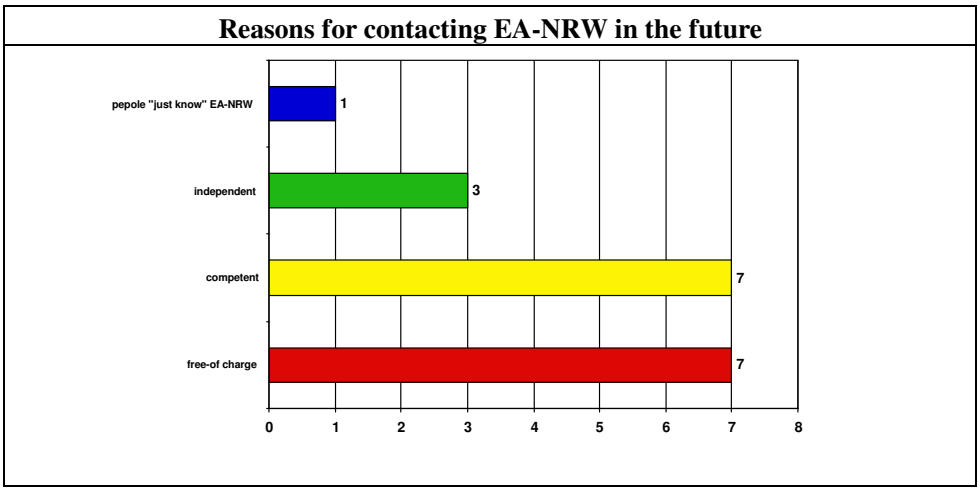
Sectors / Answers	Chemical sector	Metal sector	Total
Yes	15	22	37
No	4	3	7
No answer	1	1	2

Source: Interview Survey *Wuppertal Institute, 2006*

This question has been posed to those 46 interviewees that have not had an initial consultancy. Almost 80 per cent thought that they might contact the energy agency if necessary. Five of the interviewees asked the interviewers for the energy agency's address. This shows that some of the respondents became aware of the energy agency only because of the interview.

The following results turned up when companies were asked for the reasons for making use of the energy agency in the future:

Table 14: Reasons for contacting EA-NRW in the future

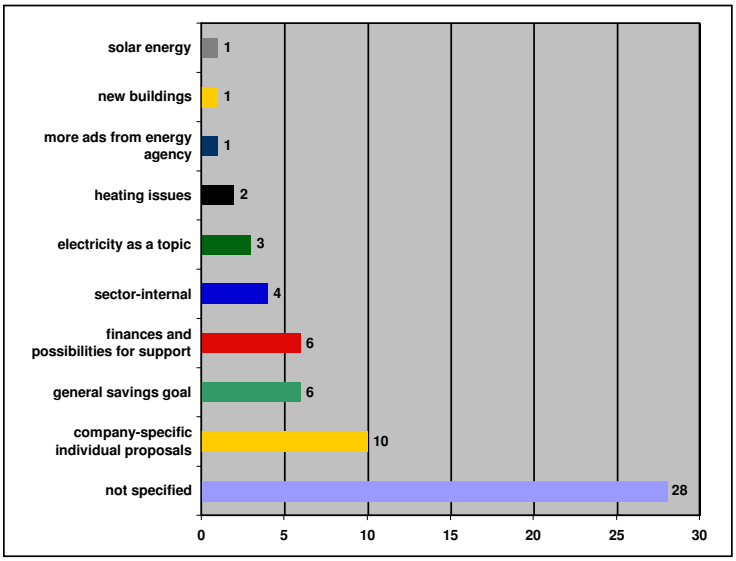


Source: Interview Survey *Wuppertal Institute, 2006*

As a reason for contacting EA-NRW in the future, 7 respondents each quoted the assumed competency and the fact that IAS is free-of-charge. Almost half of the interviewees were not able to give any reasons at all as they did not know enough about the energy agency.

A final question aimed at resounding the specific needs of companies and what kind of support could be offered by EA-NRW to address this need. Almost half of the respondents replied as follows (22 interviewees, single cases):[9]

Table 15: Do you have any further comments on energy efficiency-related topics with regard to your company – and how instruments such as the IAS, detailed energy concepts at the company or sectoral level could help?



Source: Interview Survey *Wuppertal Institute, 2006*

At the centre of attention were many company- and sector-specific questions, e.g. related to the use of industrial waste heat, optimisation of cooling or pneumatically operated installations, use of processing energy, etc..
Six answers each were related to saving energy in general and related to questions of finances and support. Both aspects have been mentioned as main reasons for measures to save energy.
More than 10 per cent of respondents said that saving energy is a constant goal within their company.

3.4 Quality of Advice and Effects in Companies

Indicator 4.1: Assessment of the quality of the advice

[9] Total answers: 34. Multiple answers were possible.

One company from the chemical sector and three companies from the metal sector have made use of the IAS. That equals 8% of respondents.
Six additional interviews have been conducted with companies who had already made use of the service. The addresses of the companies have been provided by EA-NRW.

How are the quality and effects of the IAS rated by the interviewees? As a basis for assessment for the following questions a scale from 1 (very good) to 6 (insufficient) was given according to German school grades to the four companies that were already advised.

Table 16: How do you rate the quality and effects of the IAS?

Allocated grades Questions (Criteria)	Ø of row
Quality of the IAS in general	1.9
Time between first contact, advisory and report	2.3
Quality of the analysis of weak points	2.6
Quality of the advisory regarding energy efficiency measures	2
Quality of proposals for support programmes	2.8
Total average of all interviews	2.32

Respondents graded the general quality and the temporal sequence of the IAS as nearly "good". The analysis itself, however, has been rated differently or not at all.

A final question about the quality of IAS addressed the influence the advice had on measures towards better energy efficiency that have already been realised or were planned to? Five of the respondents answered this question with "high", two with "satisfying", only one of them with "poor" (reason: "Nothing new") and one respondent didn't reply at all.

Indicator 4.2: Implemented recommendations and effects in emissions

What kind of effects could be initiated in advised companies through IAS? Since there has not been established an adequate system of monitoring, ten interviews can only provide an indication of the induced effects. Examples mentioned in the interviews were:

- A distributor and seller of car spares moved into a new building. The 500m^2 building which they shared with a bearing journal, needed a concept for the heating system. By advice of EA-NRW, this concept was developed and contacts to the producer of heating systems could be established. In comparison to the old journal, in the new one about 1/3rd of energy use could be reduced.
- A large company in the metal processing sector needed support in the installation of a heating recovery system. The contact to EA-NRW was established in a common Ecoprofit-project. The on-site inspection excavated other weak points. In sum, about 50 000 Euro/a have been saved due to a new management scheme of base load, 36 000 Euro/a through savings in lighting and almost 50.000 Euro/a through optimisations of production processes.
- Another large company from the metal processing sector contacted EA-NRW with a specific need for the optimisation of the compressed air. The 23 000 Euro investment paid off after two years already.

Three elements can be drawn from the example described above: Firstly, a specific need and interest within companies is the crucial condition to contact EA-NRW. Obviously, the institution does not genuinely initiate activities in companies. Secondly, the confidence in the advisor provides another crucial condition. Several interviewed emphasised the high level of competence of the visiting adviser ("he was an engineer"). The responsible persons in the advised companies were motivated to implement the recommended measures. Thirdly, in some analysed cases the IAS has been the starting point for a continuous co-operation between the related company and EA-NRW. In this sense, IAS is also the core for the establishment of a regional network on energy efficiency.

4 Conclusions

4.1 Summary outcomes (net impact, effectiveness and cost efficiency)

The impact of the instrument cannot be calculated since no data on the effects at the company level hase been generated. Effectiveness has not been possible to calculate since no quantitative targets on energy savings of CO_2-reductions were formulated.

4.2 Success and failure factors

Factor 1: Problem awareness of companies on energy use

Although the service is cost-free and requires only low efforts from interested firms, the success of such instruments is dependent on several framework conditions structuring the problem awareness within SMEs:

- During the end of the 1990s, the liberalisation of the German energy market started. Fallen prices for energy costs in the short run and the expectation of low energy costs in the long run as well reduced the need for energy advice in SMEs. The increase of energy prices and the "renaissance" of the debate on energy efficiency in Germany (and the EU) changed the framework conditions for such services fundamentally.
- Many companies (especially SMEs) have a long tradition regarding the use of renewables in heat production, such as companies in the horticulture sector (e.g. use of biogas in glass houses) or wood processing (e.g. thermic utilisation of waste producs).
- The analysis of production processes at the company level requires confidence between the consulting engineer and the responsible personnel in a company. Also with regard to a limited time frame, the service predominantly focuses on cross-sectoral technologies.

Factor 2: Knowledge about the service and confidence in the institution

Interviewed companies do just partially know of advisory services of EA-NRW. Roughly a fifth of those that had been interviewed have heard of the institution and the provided advisory services. However, at least 80 per cent of respondents were basically willing to contact the energy agency in the future. 20 per cent of the interviewees appreciate the energy agency's expertise and neutrality.

Neither the federal state, the local authorities nor the Chambers of Commerce and Industry were among the primary contacts which were usually addressed regarding energy efficiency-related questions. It was expected that consultancy services should be particularly provided by the electric utilities or by the respective trade or sector association, or private consulting engineers to be hired.
Energy efficiency and energy saving respectively was high on the agenda with approximately 75 per cent of all enterprises. It can be said that there is a need for consultancy services and that there is only a limited use of existing instruments.

Factor 3: Monitoring and evaluation

The instrument is not embedded in an adequate monitoring system. For this resaon, there is no actual and solid information available about the induced effects in advised companies. Information about investments and saved energy costs are based only on rough estimations and by now the internal data bank of EA-NRW is structured more as an internal documentation of the job performance of the staff instead as a monitoring system of the overall instrument.

4.3 Learning experiences

As services offered for the company level, IAS can be regarded as a useful completion of activities in NRW focusing on the manufacturing industry and SMEs. For this reason, we recommend a continuation of the instrument on the condition of the following improvements:

(1) Objectives and concept: We recommend to conduct IAS also in the future if qualitative objectives and quantitative targets will be clarified. How many companies should be contacted during a defined time period, how many firms should be approached directly? What are targets in the long run? etc. From our point of view the instrument needs to be more precise and more flexible, more precise with regard to its objectives and more flexible with regard to the services being offered. Relating to the former, there has been no objective formulated for the instrument

except very general ones.[10] On the one hand, a clear quantitative target-setting of companies to be reached and advised helps to establish a project-based capacity planning of the consulting staff at EA-NRW. Besides quantiative precisements, on the other hand, we also suggest to precise the service with regard to target groups: Currently, EA-NRW defines no main foci of its work, IAS is a stand-by offer for interested companies from all industry and service sectors. A more flexible approach would help to temporarily define limited *sectoral* or *technological foci of work*, based on clear internal rankings of sectors and technologies that are being addressed through the service. Active acquiring of firms in the metal processing sector could be succeeded by activities in the chemical sector, etc. The change from a (relatively) passive instrument towards consciously defined and temporarily limited projects requires active influencing of the framework conditions of the instrument, as well as the establishment of close collaborations with sectoral stakeholders, associations and the Chambers of Commerce and Industry. How could ways of communication within sectors be used to acquire firms and to interest them for advisory services?

(2) Integration of instruments: The state of NRW offers advisory services at both the sectoral and the company level. However, especially the services offered by EA-NRW (Initial Advisory Services) for SMEs and the services direcly offered by the Federal State's Ministry for Economic Affairs, SMEs and Energy (ECTIS, energy concepts at the company level) have not yet been sufficiently co-ordinated. By now, both institutions have conducted their own PR and advertising. Against this background, we recommend a stronger integration of instruments through defined working emphases and projects. An example is a commonly developed, and temporally limited, project for one sector (e.g. the chemical industry), in which both institutions offer a revised (lean) sectoral concept, initial advisory services and, especially for companies who want to go further in the process, the co-funding of individual energy concepts. However, this would require common planning and management of activities, co-ordinated activities in advertising, networking and PR-conduction, a commonly developed project management. The result, however, would be a concentration of limited financial resources and staff.

(3) Flexibilisation: Integration and precising objectives would justify also a flexibilisation of the instrument. The change of the character of the instrument, *thirdly*, would also require changes in the services being offered. Currently, EA-NRW has to offer the "full service package" to each interested company, no matter if this company is from the food sector or the metal processing industry or whether this company has a high level of energy intensity or only a low level. This "full package" contains data gathering, on-the-spot inspection and reporting. In many cases,

[10] Sensitising enterprises for questions of energy use and energy efficiency, providing companies information on innovative techniques and installations and technological optimisations, contributing to the reduction of energy use and CO_2-emissions in the business sector, and improving international competitiveness.

however, especially the time-intensive on-the-spot inspection of smallest enterprises (e.g. restaurants) is not obligatorily necessary, as interviewed advisors from EA-NRW reported. With regard to the recommended definition of target sectors, IAS could be more flexible and differentiated:

- Provision of information and general advice for smallest and less energy-using companies (free-of-charge)
- Offering the "full package" of initial advice service including extensive data generation and on-the-spot inspection (with a limited financial reimbursement)
- Offering the "full package" of initial advice services including extensive data generation and on-the-spot inspection for selected, and temporarily limited target sectors (with a number of services being offered free-of-charge).

(4) Monitoring and evaluation

Neither an adequate monitoring system was established nor a routine to estimate indirect or direct effects within firms. For this reason, we strongly recommend the establishment of a monitoring scheme or such routines.

(5) Feedback loops of involved stakeholders through workshop

In order to reflect the results and potentials of the instrument, the funding ministry should conduct a workshop in collaboration with EA-NRW and the federal state's project-executing organisation, in which selected stakeholders and involved actors address the following issues:

- evaluation of IAS activities and results through a selected number of participants,
- rethining incentive structures for companies,
- rethinking co-operation between ministry/ EA-NRW/ project-executing organisation and sectoral associations.

The concept of the workshop has been developed by the Wuppertal Institute.

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6 Annex

6.1 Methodology of the Survey

Methodology
The Wuppertal Institute and the Ifeu-Instiutute conducted a survey in April 2004 on the knowledge about and the use of advisory programmes that are being funded by the federal state of North-Rhine Westphalia. About 500 SMEs from the chemical and the metal industry in NRW have been selected at random from publicly available address lists of the Chambers of Commerce and Industry districts of Düsseldorf, Siegen and Aachen. At least 50 interviews with competent employees from the predetermined enterprises should be conducted by two trained interviewers.

The standardised interview guideline consisted of 13 questions split into four separate divisions.

A) Questions on the **state of the use** of energy efficiency measures in enterprises
B) Questions on the **knowledge about IAS**
C) Questions on the **knowledge about the Sectoral Concept in the Metal Industry**
D) General **final question**

The questionnaire had been pre-tested in five interviews. The length of an interview was registered at three to max. five minutes.

Conducted Interviews
Seven hundred calls were conducted. Due to wrong phone numbers, permanently busy lines or no answers at all, the survey had 382 contacts to enterprises (sample S=382 enterprises) in the metal and chemical sector in NRW.

Additionally, mere service providers (e.g. logistics or distribution) have been taken from the lists by the interviewers. After having reached the intended quotas no more interviews were conducted.

Table 17: Number of contacted firms and conducted interviews

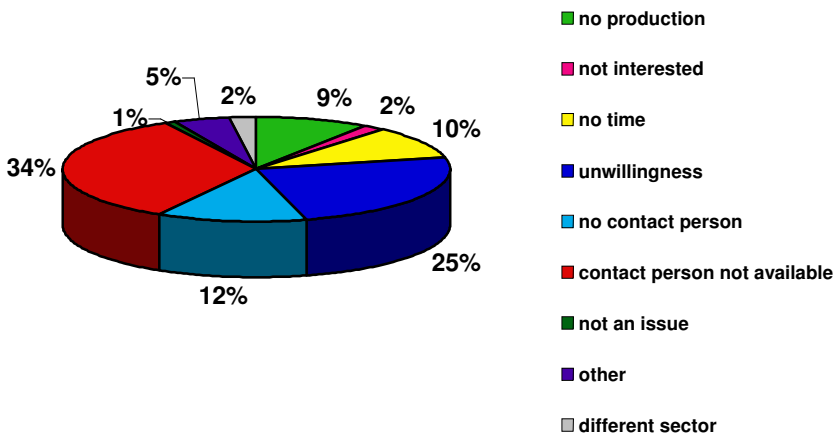
	Chemical Sector	Metal Sector	Total
Total amount of addresses	**192**	**317**	**509**
Contacted companies	**157**	**225**	**382**
Conducted interviews	**20**	**30**	**50**
Proportion	**14%**	**21%**	**17,5%**

About a third of the enterprises that the interviewers got through to rejected participating in the survey in general.

Reasons mentioned were:

- No participation in telephone interviews
- No time for interviews
- Contact person not available (holidays, business trip, meetings, etc.)
- Contact person for energy and environmental issues not existent.

Table 18: Reasons für rejection



6.2 Conducted Interviews

No.	Code of Int.	Typ of Actor	Date of Interview
1.	Int. 01/05	Project-executing organisation	16.09.2005/ 25.11.2005/
2.	Int. 02/05	Ministry	29.11.2005

3.	Int. 03/05	Energy Agency	12.09./ 22.09./ 12.12.2005
4.	Int. 04/05	Consulting Engineer 1	27.09.2005
5.	Int. 01/06	Consulting Engineer 2	04.03.2006
6.	Int. 04/06	Sectoral Association	13.03.2006
7.	Int. 02/06	Consulting Engineer 3	17.03.2006
8.	Int. 03/06	Consulting Engineer 4	24.02.2006
9.	Int. 04/06	LZI	14.03.2006