




TERRACED AND SEMI-DETACHED HOUSES




<p>Solengen, Hillerød</p> <p>Insulation, ventilation with heat recovery, airtightness, PV-modules.</p> <p>Prefabricated building project from 2005, contractor Scandi Byg, the costs of which, on the whole, were the same as for standard building projects and still live up to the low energy class 2 standard. Ventilation with heat recovery with an only 25 cm thick ventilation heat recovery unit with the exhaust air from the kitchen and the bath, and inlet air is supplied to the living room and rooms. Good airtightness and insulation are carried out without cold bridges. 2 kWp Unisolar thin film PV modules welded into a Sarnafil roof on the common house.</p> <p><i>Supported by: The EU-Resurgence and the Danish Energy Agency</i> <i>Builder: Domea</i> <i>Architect: Nielsen & Rubow Arkitekter</i></p>	<p>2005</p>	
<p>Portsmouth City Council, Portsmouth, UK</p> <p>Insulation, ventilation, solar collector</p> <p>A new low energy building project with 13 dwellings. Use of Danish solutions, such as: PV driven ventilation, extra insulation, energy efficient windows, solar collector for domestic hot water, condensing gas furnace and subsequent quality check by various measurements.</p> <p><i>Supported: EU-Green Housing Block</i> <i>Builder: Portsmouth City Council</i></p>	<p>2004</p>	
<p>Munkesøgård</p> <p>Wooden constructions, insulation, floor heating, wood chip furnace, solar collector, heat recovery, green accounting</p> <p>The building project Munkesøgaard consist of 100 dwellings divided into 5 housing units with one common house each, three public utility housing units for young people, seniors and families respectively, one owner housing unit and one co-operative housing unit. The buildings are supplied with district heating and further with two centrally situated wood chip furnaces and a solar heating system installed on the five common houses. The buildings are equipped with load-bearing wood constructions, wood or stone facades and are supplied with non burned bricks within the building. Emphasis on low energy consumption, for each dwelling 30 – 40 W at the most.</p> <p><i>Builder: Roskilde Boligselskab og private owners</i> <i>Architect: Nielsen og Rubow arkitekter A/S</i></p>	<p>2000</p>	

Multistorey building

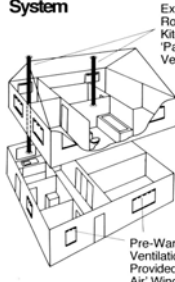
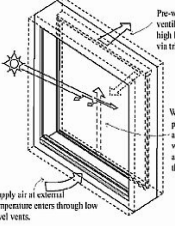




<p>Rønnebækshave II, Næstved</p> <p>The first Passive House in Denmark Heat recovery, PV-modules, total economic optimisation, Energy efficient windows, insulation, solar heating, heat pump with ground pipes</p> <p>In the Danish part of the GREEN Catalogue project 8 out of 23 dwellings in Rønnebækshave II in Næstved were built according to the German "Passiv Haus" standard with a yearly heat consumption of only 15 kWh/m².</p> <p>Equipped with a thick layer of insulation, passive house windows from Germany, counter flow heat recovery on ventilation air from EcoVent, 5 kWp PV-modules from Gaia Solar, a 28m² solar collector for domestic hot water and an earth heat system from the company IUT naturvarme.</p> <p><i>Supported by: The EU</i> <i>Builder: Domea</i> <i>Architect: Sunesons Tegnestue</i></p>	2005	
<p>Dalgasparken, Herning</p> <p>Ventilation with heat recovery, energy efficient windows, insulation, solar collector, PV-modules</p> <p>Dalgasparken with 72 dwellings and a common room. Dalgasparken was built with focus on ventilation with heat recovery. Further the focus was on avoidance of cold bridges and also aimed at optimal airtightness. Measurements show a halving of the district heating costs on this basis alone. Further installation of 200 m² PV-modules to cover the electricity consumption for ventilators. The contractor was KPC Byg.</p> <p><i>Supported by: The EU-Resurgence</i> <i>Builder: Boligselskabet Fruehøjgaard</i> <i>Architect: Cobra Arkitekter</i></p>	2003	
<p>Hammerthor, Herning</p> <p>Ventilation with heat recovery, energy efficient windows, insulation, solar collector</p> <p>A former cloth mill converted into 29 dwellings. The dwellings are built as low energy dwellings with several energy saving measures. The following has been implemented: ventilation with heat recovery with focus on airtightness, a high degree of heat recovery and a low electricity consumption for ventilators. Some of the rooms are heated with ventilation air exclusively. 7 kWp grid connected PV-modules are installed on the roof.</p> <p><i>Supported by: The Danish Energy Agency and the EU-Resurgence</i> <i>Builder: Boligselskabet Fruehøjgaard</i> <i>Architect: A2 Tegnestuen</i></p>	2003	
<p>Havremarken, Frederiksberg</p> <p>PV-modules, heat recovery</p> <p>In connection with the retrofit of the Havremarken 57,2 m², (5,8 kWp), PV-modules were installed in a row along the ridge of the roof. They supply 70 dwellings with electricity. The balance electricity, if any, is transmitted to the electricity grid.</p> <p><i>Supported by: The EU</i> <i>Builder: KAB</i> <i>Architect: Nielsen og Rubow arkitekter A/S</i></p>	2002	
<p>Lauritz Sørensens Gård, Frederiksberg</p> <p>PV-modules, preheating of ventilation air</p> <p>In connection with retrofit and alterations of attics into dwellings 15 m² PV-modules were installed for each stairway. The PV-modules were installed to form a so-called "Canadian Sun Wall", where little holes cool the modules and thereby assist in preheating of the ventilation air to the dwellings. Each dwelling is temperature controlled.</p> <p><i>Supported by: The Danish Energy Agency</i> <i>Builder: Frederiksberg Boligfond</i> <i>Architect: Karsten Pålsson A/S Arkitekter maa</i></p>	2002	






Schools and institutions

<p>Prøvehallen</p> <p>PV-modules, solar collector, extra insulation, hybrid ventilation, energy efficient windows, EMS system</p> <p>Retrofit of an industrial building, originally part of a porcelain factory, now altered into a "various activities" hall. On the basis of a total economic calculation a number of energy saving initiatives have been implemented. Compared to a reference building project these initiatives give a saving of more than 50% concerning heating and approx. 1/3 saving on domestic hot water. Approx. 60% of the energy for heating of domestic hot water will be supplied by solar energy. <i>Supported by: The EU</i> <i>Builder: Københavns Kommune (Copenhagen Municipality)</i> <i>Architect: RIA</i></p>	2005	
<p>Kunstakademiets Arkitektskoles Kantine, København</p> <p>Installation of PV-modules, placed in an aluminium profile, with the possibility of producing electricity to the electricity grid. The PV-modules are installed on the roof of the canteen of the Kunstakademiet, (Academy of Fine Arts), and this gives a good exposure, especially regarding the students, as the modules are very decorative. <i>Supported by: The EU, the SOL 1000-programme and Copenhagen Municipality</i> <i>Builder: The Academy of Fine Arts School of Architecture</i> <i>Arkitekt: Fogh og Følner's tegnestue og SOL1000 Arkitektgruppen</i></p>	2005	
<p>Valby Ny Skole, Valby (Valby New School)</p> <p>A total of 47,5 kWp PV-module system installed on various buildings. Development of liquid cooled PV modules which in combination with a heat pump can draw the heat from the PV modules and by doing so increase their yield and at the same time supply heat for domestic hot water. <i>Supported by: The EU</i> <i>Builder: Copenhagen Municipality</i> <i>Architect: RIA</i></p>	2003-	
<p>Tjørnehøjskolen, Brøndby (School)</p> <p>In the passages of an annex to the school a No. of PV-modules have been installed in a very attractive, architectural combination. E.g. the electricity from the PV-modules is used for ventilation, and a survey of the electricity produced will automatically be registered on the Internet server. <i>Supported by: The EU</i> <i>Builder: Brøndby Municipality</i> <i>Architect: Lars Thøger</i></p>	2003	
<p>Engstrandskolen, Hvidovre (School)</p> <p>PV-controlled exhaust solution as supplement to natural ventilation for a 800 m² wing. Consequently the ventilation of the school becomes CO₂ neutral. The advantage of the installation is that it starts up when the sun is shining and consequently requires the ventilation the most. <i>Supported by: The Danish Energy Agency and the EU</i> <i>Builder: Hvidovre Municipality</i> <i>Architect: Nielsen og Rubow arkitekter A/S</i></p>	2002	







<p>Medborgerhus, Valby (Community House)</p> <p>A ventilation unit is installed for the system at the top of the community house where PV-modules produce electricity for the ventilators. The ventilators are manually regulated according to the number of persons present in the room. At basis ventilation the amount of air is 360 m³/h. The Ventilation is always set on basis ventilation, a clock turns off the ventilation at night. In slack periods it is also possible to turn off the ventilation.</p> <p><i>Supported by: The EU, The Danish Energy Agency and Copenhagen Municipality</i> <i>Builder: Copenhagen Municipality</i> <i>Architect: Klaus Boyer Rasmussen, SolarVent</i></p>	2001	
<p>Ålholm skole, Valby (Aalholm School)</p> <p>In connection with the retrofit of Aalholm School an architectural designed entrance with PV-modules and a sun wall were installed. These produced electricity as well as heat. The purpose of the project, which is a part of the EU-Joule project, PV-Vent, is to document the yield of hybrid PV-modules and sun walls, as well as the development and the documentation of the solar installation.</p> <p><i>Supported by: The EU and the Danish Energy Agency</i> <i>Builder: Frederiksberg Boligfond/PrivatBo</i> <i>Architect: Klaus Boyer Rasmussen, SolarVent</i></p>	2001	
<p>Fløng Skole (Floeng School)</p> <p>In connection with a retrofit of the heating plant and the ventilation system of the school, natural ventilation and an improved utilisation of daylight were implemented. An increased ceiling height and new overhead lights were installed in order to obtain a good natural ventilation and a pleasant indoor air climate. Fresh air is supplied to the rooms through valves in the parapet and further preheated by radiators. The amount of fresh air is controlled by an EMS system depending on the temperature and the CO₂ level of the rooms.</p> <p><i>Supported by:</i> <i>Builder: Høje Taastrup Municipality</i></p>	2001	

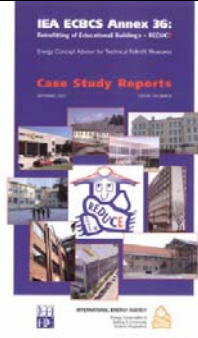


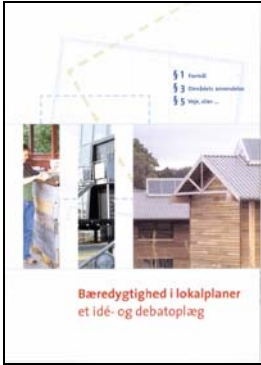

Other projects



<p>AVASH – Advanced Ventilation Approaches for Social Housing</p> <p>The purpose of the project is to clarify the conditions of ventilation in connection with the retrofit of the existing housing stock, and list guidelines on how to secure an efficient and economically attractive ventilation. Typically an energy retrofit includes re-insulation and tightening of the building envelope which may cause changed ventilation and indoor climate conditions and result in damage on the building and cause inconveniences for the tenants.</p> <p>The project includes a check of the standard of energy for representative types of buildings. The check is carried out in England, Ireland and Denmark and includes several check tests of the insulation condition of the building envelope and airtightness. On basis of the building checks a number of suggestions are listed for solutions as regards energy efficient ventilation for selected types of buildings. Various ventilation solutions will be considered such as mechanical exhaust with heat recovery, natural ventilation, solutions regarding windows with inlet air together with the degree of tightness of the building envelope.</p> <p>Emphasis is placed on the presentation of the result which takes place via guidelines, reports, articles and various presentations at relevant seminars and conferences.</p> <p>Supported by: The EU project, Intelligent Energy – Europe (IEE). Co-ordinator: University of Brighton, Dr. Ryan Southall</p>	<p>2006-</p>	<p>Low-Energy Whole-House Ventilation System</p>  <p>Extract from 'Wet' Rooms: Bathrooms, Kitchens etc. by 'Passive Stack' Vents</p> <p>Pre-Warmed Ventilation to Rooms Provided by 'Supply Air' Windows</p>  <p>Pre-warmed background ventilation is delivered at high level into the room via trickle vent.</p> <p>Warm air rises in the plenum between outer and inner panes and is warmed by solar heat and heat reclaim from the room.</p> <p>Supply air at external temperature enters through low level vents.</p>
<p>Factor4</p> <p>Cenergia participates in the EU-project – Faktor 4 in connection with the programme "Intelligent Energy of Europe", the aim of which is to illustrate the energy measures required in order to reduce the CO₂ leaks in council housing stock in year 2050 by 75%. In the project a typology is defined which divide the existing housing stock according to conditions which are important for the yield of the buildings as regards energy. Three representative housing blocks are tested and various improvements are considered to give a comprehensive economic consideration which will form the basis of an estimate of the potential economy.</p>	<p>2006-</p>	
<p>EI-Education</p> <p>The EU project EI-Education; Energy Intelligent Education – aim at preparing a teaching programme for the housing associations in order to motivate and give instructions regarding energy optimised retrofit. The teaching programme is based on the European "best practice" examples and this, together with a survey of practical solutions and a check list, will be collected in a Guidebook.</p>	<p>2006-</p>	
<p>GreenIT</p> <p>An R&D project on Eco Labelling of products and construction materials in relation to the EU-Energy Performance Directive for Buildings. From Denmark the energy specialist company Cenergia participates as well as the Danish Building Research Institute, (SBI). Further participants are the companies CSTB from France, BRE from the UK, CRES from Greece, ENETI from Portugal and Ecofys from Germany.</p>	<p>2006-</p>	
<p>UpperTen</p> <p>The UpperTen project consists of 11 new single-storey houses which are to be built in the Trekroner area in Roskilde. The houses are built as single-storey as well as two-storey houses and are very special partly because of their architecture and partly because of an extremely low energy consumption. Almost all of the houses are built according to the low energy class 1. They are inclusive of solar energy, heat pump and ventilation with heat recovery. Further they come with Nordic Eco Labelling, (Swan labelling), and are built with "green" materials.</p>	<p>2006</p>	

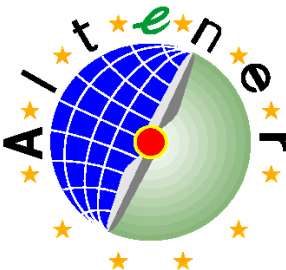



<p>Ullerødbyen, Hillerød</p> <p>Low-energy building project and innovative heat supply With optimisation of the energy supply to the new neighbourhood Ullerødbyen in Hillerød with focus on the extension of the district heating solutions with least possible losses. The project was started in connection with the new low energy standards 1 and 2 with respectively 50% and 25% improvements as compared to the level of the building regulations. Future low energy building projects will have a much lower heating consumption than the existing housing stock, and just now work is carried out concerning combined solutions for low energy housing projects and innovative heat supply solutions, including local and individual heat solutions. <i>Supported by: The project EU-Secure</i> <i>Partner: El, Vand og Varme in Hillerød</i></p>	2006	
<p>Stenløse Syd</p> <p>The Stenløse Municipality has decided to require that henceforth all housing projects should be constructed as low energy houses. The demand is formulated as a registered easement in connection with the sale of building lots. From the early start the building process has to be evaluated on a whole and this requires a co-operation between the single participant. The total experience of the project will be disseminated through an EFP-project which is a project supported by the Danish Energy Agency in the programme for Energy-Research-Programme 2005. Website: www.stenloesesyd.dk</p>	2005-	
<p>Solar City Horsens</p> <p>A project inspired by the company Solar City Copenhagen. Total energy plan, planning and organisation of a number of renovation projects where the implementation of PV-modules is an integrated part. Including the establishment of a formal partnership agreements, further development and test of full scale PV-module test roofs, development of test houses for energy class 1 and 2, and preparation of a total Solar City Horsens brochure.</p>	2005-	
<p>Solcellelaug (PV Guild)</p> <p>The procedure for a PV Guild is similar to a windmill guild. The PV Guild was founded in connection with the company Solar City Copenhagen and is named "Copenhagen PV Guild". In co-operation with Copenhagen Energy a PV exchange was established where private citizens and companies can buy solar power at a price fixed in advance. On the basis of this the PV Guild is in a position to establish PV units taking into consideration production price, price of unit and operation costs. For additional information see www.solcellelaug.dk.</p>	2005-	
<p>Solceller KMEK (PV-modules KMEK)</p> <p>The Energy Service Denmark has effected the implementation of three PV units in Norrebro: 22 m² on the roof of the cafeteria of Assistens cemetery, 31,9 m² on the roof of the World Cultural Centre, (previously the culture centre in Norreallé), and 14,7 m² on the roof of the Okologihuset in Blegdamsvej (Environmental House) These PV units make renewable energy very visible in the townscape. <i>Supported by: The EU-Resurgence, the Sol1000 programme and Copenhagen Municipality</i> <i>Builder: Copenhagen Municipality</i></p>	2005	

<p>BESTCert</p> <p>The EU project "Building Energy Standards – Tool for Certification" – BESTCert deals with the development of a certification tool. The development of a labelling or certificate tool with a starting point in benchmarks will be able to handle EPBD. Five countries participate and the participants for each country have chosen a school and a reference building for registration of data to be used in the project. In connection with the BESTCert project a website has been prepared: www.bygningsenergi.dk, which deals with the Danish implementation of the European Energy Performance of Buildings Directive (EPBD).</p>	2004-	
<p>CO₂ neutral tagboliger (CO₂ neutral rooftop dwelling)</p> <p>In co-operation with a number of companies Cenergia has participated in the development of the so-called CO₂ neutral rooftop dwelling concept. The vision for the rooftop dwelling is based on the retrofit of concrete buildings from the sixties and seventies, buildings which typically now have problems with flat roofs. The rooftop dwelling has been designed according to environmentally desirable and energy efficient principles such as hybrid ventilation, heat recovery, passive solar heat, PV-modules and solar collectors. The rooftop dwelling is prefabricated in wood assembly units which make transportation and installation on a roof easy. The concept has a wide perspective in relation to a qualitative development of problem residential areas and at the same time a future perspective in being CO₂ neutral.</p>	2004-	
<p>Solceller & Arkitektur (PV-modules & Architecture)</p> <p>Focus on the architectural integration of PV units on building facades. E.g. with issued catalogue for inspiration and with advice and presentation of existing obvious possibilities. A part of the large PV project for Valby New School where a new type of liquid cooled PV modules are developed and where PV modules are installed as part of an artistic decoration on the gable. Also supports Solar City Copenhagen. (www.solarcity.dk).</p>	2004	
<p>SOLAR-CITIES</p> <p>In the EU-project Solar-Cities the aim is to disseminate knowledge of how it will be possible for the various cities to reduce their CO₂ level. Emphasis on use of renewable energy initiatives and better utilisation of energy. Information on existing projects are gathered in a "Good practice guide" which will help the various cities to utilise the existing environmental measures (technologies).</p>	2002-2004	
<p>Folehaven, Valby</p> <p>In connection with the building of an eco-laundry 41 m² PV unit was integrated on the roof and on the gable. The aim of the project was to develop a new principle for combined electricity and heat utilisation of PV modules. In this connection an important part of the project was to develop a building integrated PV design with combined heat and electricity production where PV modules supply heat to a building by help of ventilation air. <i>Supported by: The Danish Energy Agency</i> <i>Builder: 3B</i> <i>Architect: Klaus Boyer Rasmussen, SolarVent</i></p>	2001-2004	
<p>Resurgence</p> <p>The EU-project "Renewable Energy Systems for Urban Regeneration in Cities of Europe", Resurgence. The aim of this project is to install a total of 1,3 MWp PV-modules in five European countries. In Denmark 390,16 kWp PV-modules have been installed. The aim of the project was to ascertain that the installation should take place within the area of social sustainability and with an investigation of the liberalised electricity market with a view to the possibility of financial innovation. In Denmark a wide range of PV projects were realised, among these the SOL-1000 project which has offered easily installed PV units with financial support to tenants of one-family houses. 178 dwellings have had the PV unit installed with a total of 327 kWp.</p>	2003-	

<p>DEMOHOUSE</p> <p>With focus on energy optimisation of retrofit projects, e.g. regarding the new EU countries, the EU-project DEMOHOUSE has been launched in order to develop minimum standards, recommendations and agreements on quality.</p> <p>The contents of the project are pilot projects in which experiences from R&D projects are going to be implemented. These experiences will then be tested on actual retrofit projects.</p> <p>In the Danish project the experiences made from "the small house" as regards the development of the CO₂ neutral rooftop dwelling. The demonstration project is Gyldenrisparken in Amager.</p>	2003-	
<p>BRITA in PuBs</p> <p>»Bringing Retrofit Innovation to Application in Public Buildings «BRITA in PuBs» is an EU-project which deals with innovative and efficient retrofit solutions for the improvement of energy efficiency and implementation of renewable energy sources.</p> <p>The project brings into focus pilot projects for sustainable energy systems in public buildings and further the requirements for project planning and the possibilities of alternative financing.</p> <p>The general idea is that it is possible to further comfort and at the same time save energy in large buildings.</p> <p>Nine countries are participating in the project, and in Denmark the retrofit of Prøvehallen in Valby is part of the project.</p>	2003	
<p>Studenterhuset Herning</p> <p>The combination of two PV solutions: Development and test of sunlight protection with integrated PV-modules a total of 6 kWp, 25 m² sunlight protection together with 35 m² PV modules on consoles, (E-consoles) on a flat roof.</p> <p><i>Supported by: The Danish Energy Agency</i> <i>Bygherre: Fruehøjgård Housing Association</i> <i>Architect: A2 Tegnestuen</i></p>	2003	
<p>Cirkusbygningen, Valby</p> <p>Two different PV fit in solutions adapted for tar paper roofs. The tests are part of a large PV-project in Valby, Copenhagen, and is the basis for a larger installation on the Circus Building.</p> <p><i>Supported by: The Danish Energy Agency, EU-Resurgence</i> <i>Builder: Cenergia</i> <i>Architect: Klaus Boyer Rasmussen, SolarVent</i></p>	2003	
<p>CO₂ neutralt forsøgshus (CO₂ neutral test house)</p> <p>In co-operation with a number of companies Cenergia has developed a 32 m², low energy, wooden test house. The house is a successful test house for the demonstration of the so-called "passive house" concept.</p> <p>The house is insulated with paper granulate, is completely airtight and without cold bridges. The house was tested with Cenergia's "Blower Door" just as it was thermo photographed. The blower door test did not show any measurable values and this shows that the house was without cold bridges.</p> <p>The roof is equipped with integrated PV-modules which make the house CO₂ neutral. The electricity produced on a yearly basis will cover the energy consumption.</p>	2001-2004	
<p>ESPON</p> <p>With the subtitle "Territorial trends of energy services and networks and territorial impact of EU energy policy" is an EU-project which dealt with trends within energy supply and requirements for energy supply. Using data collection the relation between energy supply and the general development of a given area was explained, and it was established which of the regions were influenced the most of minor changes within the area of energy.</p> <p>The project investigated all EU countries as well as Switzerland and Norway, but was managed by a co-operation between Denmark, Italy, Portugal and Poland.</p>	2003	

<p>IEA ECBCS Annex 36</p> <p>A part of the project of the International Energy Agency "Energy Conservation in Buildings and Community System Programme (ECBCS) is "Annex 36: Retrofitting of Educational Buildings – REDUCE, Energy Concept Adviser for Technical Retrofit Measures". Among other things the project resulted in the publishing of a book the contents of which go through the case studies of retrofit of schools and institutions where energy saving initiatives were implemented.</p> <p>Cenergia was editor on the book. Further, in connection with the project, an "energy concept advisor" for energy optimised retrofit was prepared.</p>	2003	
<p>Futura II, Fredericia</p> <p>Energy efficient heat distribution.</p> <p>In the building Futura II in Fredericia a new principle for heat distribution has been demonstrated. The heat is distributed to the dwellings by use of domestic water circulation. The advantages are a lower heat loss and less expensive initial costs compared to more traditional distribution principles. The supply is suitable for future low energy building projects because the heat flow rate for new dwellings becomes still lower. Further it will be possible to adapt the system to a regular industrialised heating system for dwellings.</p> <p><i>Supported by: The Danish Ministry of Economic and Business Affairs Builder: The Housing Association Futura v/Dansk Boligselskab</i></p>		
<p>Kina</p> <p>Exchange of knowledge, passive solar heating, energy optimisation. Supported by the World Bank Cenergia entered into a project of development in a consultative capacity. With an exchange of knowledge the aim of the project was to further energy optimised building by use of passive solar heating, additional insulation and quality check for the duration of the building project. Using this procedure it was possible to avoid the traditional heating by coal. A total of 58 projects in each of the three provinces, Gansu, Qinghai and Shanxi, were implemented. Cenergia acted in a consultative capacity in the first six projects in each province, whereupon the experiences from these first projects were carried on.</p> <p><i>Supported by: The World Bank</i></p>	2002-2003	
<p>Bæredygtighed i lokalplaner (Sustainability in community development plans).</p> <p>With means from the Urban Pool the National Agency for Enterprise and Construction has supported the preparation of the brochure "Sustainability in community development plans – Idea and Introduction to a debate".</p> <p>The brochure applies primarily to building departments in small municipalities which administer the preparation of community development plans which try to implement sustainable aspects. In this project the Bycirklen (City Circle) participated, the City Circle involves a co-operation between 9 small municipalities. Using this project as a tool the sustainability concept was integrated and the technical / economic basis for sustainable technologies and implementations was incorporated and documented. On basis of this the guidelines for method and administration for implementation of sustainable aspects in the community plans have been carried out. Builders could also use this as an inspiration.</p>	2000-2002	
<p>Solcelleværk Valby (Solar Works Valby)</p> <p>In a co-operation between Cenergia, Kuben Urban Renewal Denmark, Copenhagen Energy and Copenhagen Municipality a plan for 25% coverage of the electricity consumption in Valby has been launched. The coverage comes from building integrated PV-modules with a total of 100.000 m² PV-modules. The preproject was supported by the Danish Energy Agency and the National Agency for Enterprise and Construction (NAEC).</p>	1999-2002	

<p>PV-Optitag 1 + 2</p> <p>R&D project with development and testing of optimised building integrated PV solutions with possibility of combined PV and thermal use.</p> <p>In connection with the PV project in Valby, Copenhagen, a number of tests are being carried out involving combined PV and heat pump operations where liquid cooled PV modules connected to a heat pump can use the heat generated in the PV-modules and thus optimise the electricity production of the PV.</p>	2001-	
<p>InSolPlan</p> <p>An EU Altener project which also obtained support from the Danish Energy Authority. The project title is: "Solar Development of New Residential Areas – An European Competition for Sustainable Building".</p> <p>In Denmark an architectural competition was launched for the Trekroner area in Roskilde. Cenergia was involved in specifying the general outline / demands for the competition.</p> <p>These were e.g. demands for the CO₂ emission by use of buildings, innovative technologies and concepts, average insolation of minimum 80%. A minimum of 30% of room heating should be covered by passive solar use, and further that the average ratio between surface area and the volume of the building is less or equal to 0,5 per m².</p>	2001-	
<p>100RESCO</p> <p>The project deals with the possibility of integrating a 100% coverage of the energy consumption with renewable energy in small local communities. Inherent in the project is a number of pilot tests which will be analysed in order to name the possibilities and prevailing conditions which will have a possible influence on the integration of renewable energy. In order to transfer the results to similar small communities in Europe each of the tested areas will be classified according to their status for energy consumption, socio economic conditions, climate and natural resources. From Denmark Læsø and Stenløse were chosen as pilot projects.</p>	2000-2001	
<p>Roskilde Bank</p> <p>In this project the technology used in connection with the ventilation towers in Lineagården and Trekanten, both in Frederiksberg, was developed for commercial building, primarily with ventilation of office buildings in mind. Here it was necessary to change the design thus making it architectural and functionally possible to adapt it to a building project with a flat roof. Therefore, the ventilation towers were amended to "chimneys" where the chimney facing south is made of perforated metal plates and mounted with PV-modules. The perforated metal plate functions as air solar collector which will warm up the ventilation air with heat from the PV-modules.</p>	2001	
<p>PV-Vent</p> <p>The EU-project PV-Vent deals with the development of a low energy ventilation concept where PV-modules in combination with heat recovery result in improved indoor air climate in new built as well as in connection with retrofit. The electricity generated by the PV-modules operates the ventilation which use heat recovery and where inlet air is preheated below the PV-modules. By direct use of the produced electricity for ventilation it was not necessary to convert the current and losses could be avoided. Further the project focuses on the architectural integration of the PV-modules on the building facade.</p>	2001	
<p>PV-Optitag 1 + 2</p> <p>R&D project with development and testing of optimised building integrated PV solutions with possibility of combined PV and thermal use. In connection with the PV project in Valby, Copenhagen, a number of tests are being carried out involving combined PV and heat pump operations where liquid cooled PV modules connected to a heat pump can use the heat generated in the PV-modules and thus optimise the electricity production of the PV.</p>	2001-	

<p>InSolPlan</p> <p>An EU Altener project which also obtained support from the Danish Energy Authority. The project title is: "Solar Development of New Residential Areas – An European Competition for Sustainable Building".</p> <p>In Denmark an architectural competition was launched for the Trekroner area in Roskilde. Cenergia was involved in specifying the general outline / demands for the competition.</p> <p>These were e.g. demands for the CO₂ emission by use of buildings, innovative technologies and concepts, average insolation of minimum 80%. A minimum of 30% of room heating should be covered by passive solar use, and further that the average ratio between surface area and the volume of the building is less or equal to 0,5 per m².</p>	2001-	
<p>100RESCO</p> <p>The project deals with the possibility of integrating a 100% coverage of the energy consumption with renewable energy in small local communities. Inherent in the project is a number of pilot tests which will be analysed in order to name the possibilities and prevailing conditions which will have a possible influence on the integration of renewable energy. In order to transfer the results to similar small communities in Europe each of the tested areas will be classified according to their status for energy consumption, socio economic conditions, climate and natural resources. From Denmark Læsø and Stenløse were chosen as pilot projects.</p>	2000-2001	
<p>Synpack</p> <p>The EU-project "Synergy Package Approach for Energy Optimised Building Renovation" deals with a combination of retrofit aspects for two specific projects in Copenhagen where extra insulation, installation of bathrooms, extension of rooftop dwellings, renovation of windows and improved indoor air climate with low energy ventilation were estimated using the Optibuild tool developed by Cenergia for total economic analysis.</p>	2001	
<p>PlaySun</p> <p>In connection with the EU ALTENER II "Playing With the Sun"-project: "PlaySun" work was carried out as regards design of sections for children's playgrounds all of which relates to renewable energy sources. The purpose of the project was to inform and teach children of the various possibilities for use of renewable energy through didactic games in the shape of playground systems. The project had two phases - one creative phase with focus on the possibilities in preference to actual implementation. Inherent in the second phase was the task to carry out the possibilities of renewable energy for play sections as well as general information on renewable energy for children and their families.</p>	1999-2001	
<p>SAVE – Certificering</p> <p>For the duration of the SAVE II programme Cenergia worked with 4 partners from three countries concerning the development of certification systems for Greece and Italy on the basis of Danish and British systems. The certification should apply to office buildings as well as residential buildings with focus on energy sources, CO₂ emissions, environmental conditions, water consumption, lifecycle estimations etc. In addition a method was prepared for the dissemination of certifications including a calculation tool for the identification of energy savings.</p>	2000	