TOPSECTOR ENERGIE
Empowering the new economy

Overview Dutch IEA

TCP activities with scope of TKI Urban Energy

This infographic shows an overview of a selection of the TCP's and Annexes within IEA. Read more

International Energy Agency

The IEA is an autonomous organisation which works to ensure reliable, affordable and clean energy for its 29 member countries and beyond.

read more

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PVPS

Photovoltaic Power Systems (PVPS)

The IEA Photovoltaic Power Systems programme (PVPS) conducts joint projects on the application of photovoltaic conversion of solar energy into electricity. Its mission is to enhance international collaborative efforts that facilitate the role of photovoltaic solar energy as a cornerstone in the transition to sustainable energy systems. Currently, seven research projects, so-called tasks, are established within the IEA PVPS programme.

www.iea-pvps.org

Task 12
Environmental, health and safety activities

The goal of Task 12 is to foster international collaboration and knowledge creation in PV environmental sustainability and safety, as crucial elements for the sustainable growth of PV as a major contributor to global energy supply and emission reductions of the member countries and the world.

read more

Task 13
Performance and reliability of PV systems

The overall objective of this task is to improve the operation, reliability and, consequently, the electrical and economic output of photovoltaic (PV) power systems and sub-systems. This will be achieved by providing a common platform, through which quality aspects are elaborated and exchanged amongst the stakeholders, and disseminating this knowledge to different market players.

read more

Task 15
Enabling Framework for the Acceleration of BIPV)

The integration of photovoltaic (PV) energy in the built environment has the potential to become a major development in the PV market. Although more than 100 prototypes of market-ready BIPV products exist worldwide, only a small amount achieve the transition from product/prototype.

read more

Task 16
Solar Resources

As the penetration of PV increases, improved accuracy and finer spatial and temporal resolution of solar data sets are needed to optimize the performance of these technologies in the energy system of a region or country. International collaboration and consensus on developing and managing these data sets will expedite the high penetration of solar technologies.

read more

Task 17
PV & Mobility

Task 17 focuses on possible contributions of photovoltaic technologies to transport, as well as the expected market potential of photovoltaic applications in transport. This Task addresses issues on PV-powered applications such as PV-powered vehicles, PV equipped electricity supply equipment and integrated electrical systems consisting of PV-powered vehicles including cars, trucks, etc.

read more

Task 18
Remote PV & Edge of Grid PV systems

The objective of Task 18 is to find the technical issues and barriers which affect the planning, financing, design, construction and operations and maintenance of off-grid and edge-of-grid systems, especially those which are common across nations, markets and system scale, and offer solutions, tools, guidelines and technical reports for free dissemination for those who might find benefit from them.

read more

Energy Storage (ECES)

ECES

The mission of Energy Conservation and Energy Storage (ECES) is to facilitate integral research, development, implementation and integration of energy-storage technologies to optimise the energy efficiency of all kinds of energy system and to enable the increasing use of renewable energy instead of fossil fuels.

www.iea-eces.org

Annex 34
Comfort Climate Box

Collaboration with Annex 55: aims to accelerate market development of Climate and Comfort box solutions. The technical challenge is the smart combination of different technologies in one system. Specialists from various fields of technology are required, and need to cooperate in order to accelerate product development and market introduction of combined heat pump / storage packages.

read more

Annex 35
Flexible sector coupling

The main input of renewable energy to the future power grid will be renewable electricity by wind and photovoltaics. Reaching higher shares of fluctuating renewables in the power grid may cause a variety of problems. One option to tackle these challenges, by simultaneously further increasing the share of renewable electricity in the overall energy system, is to distribute renewable electricity to other sectors, mainly the heating/cooling and the mobility sector.

read more

Annex 36
Carnot Batteries

Carnot Batteries are an emerging technology for the inexpensive and site-independent storage of electric energy at medium to large scale. Also referred to as "Pumped Thermal Electricity Storage" (PTES) or "Pumped Heat Storage" (PHES), a Carnot Battery transforms electricity into thermal energy, stores the thermal energy in inexpensive storage media such as water or molten salt and transforms the thermal energy back to electricity as required.

read more

Annex 38
Ground Source de-icing for infrastructure

Thermal de-icing and snow melting approaches to control of winter conditions on infrastructure surfaces offer a number of advantages compared to conventional techniques. These include the automated control of safe surface conditions, avoidance of chemicals and their environmental impact and prolongation of the life of the infrastructure.

read more

Annex 39
District heating and thermal energy storage

Thermal Energy Storage (TES) is a key enabling technology for a realisation of a carbon neutral energy system. District Heating (DH) is a mature technology for the heating of the built environment, especially in large cities.

read more

Smart Grids (ISGAN)

ISGAN

International Smart Grid Action Network (ISGAN) activities focus, first and foremost, on those aspects of the smart grid on which governments have expertise or over which they have regulatory authority, convening power or other leverage. ISGAN partners work together in five principal areas: policy, standards and regulation; finance and business models; technology and systems development; user and consumer engagement; and workforce skills and knowledge.

www.iea-isgan.org

Annex 1/2
Smart Grid Drivers and Cases

Many participating ISGAN countries are already developing, demonstrating, testing, and deploying smart grid technologies and systems, drafting policies and implementing regulations to advance smart grids, assessing current and projected transmission and delivery infrastructure needs, evaluating demand-side practices, and measuring other aspects of smart grids.

read more

Annex 4
Synthesis of Insights for Decision Makers

Annex 4 aims to organise smart-grid knowledge, identify key issues, distil important themes and provide insightful analysis for the benefit of international decision makers. It highlights existing smart-grid implementation best practices and lessons learned, and seeks to integrate and package knowledge in a useful application format for the target audience.

read more

Annex 5
Smart Grid International Research Facility Network

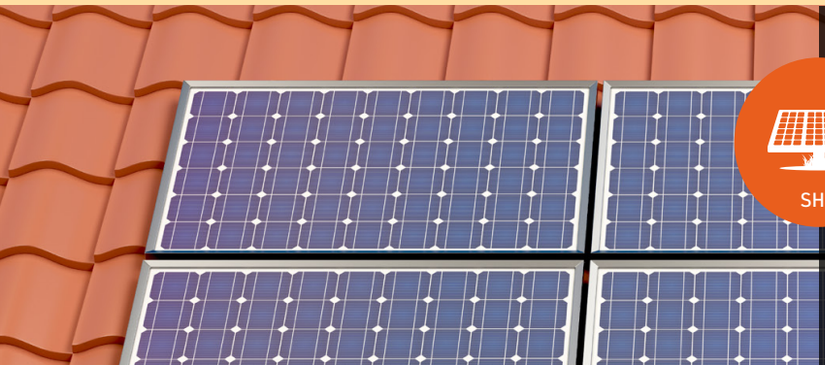
Annex 7
Smart Grid Transitions on Institutional Change

The Smart Grid International Research Facility Network (SIRFN) will give participating countries the ability to evaluate pre-competitive technologies and systems approaches in a wide range of smart grid implementation use cases and geographies using common testing procedures.

read more

Annex 7 investigates governance and socio-technical challenges associated with smart-grid deployment. The annex further aims to serve as the catalyst for international, co-ordinated and trans-disciplinary research activity in the social sciences, to complement and support technology-oriented smart-grid activities.

read more



SHC

Solar Heating & Cooling (SHC)

The IEA Implementing Agreement on Solar Heating and Cooling (SHC) was established in 1977 with the objective of co-operative research, development, demonstration and exchange of information regarding solar heating and cooling systems.

www.iea-shc.org

Task 59
Deep Renovation of Historic Buildings Towards Lowest Possible Energy Demand and CO_2 Emission (NZEB)

Historic buildings make up a considerable part of our building stock (one fourth for Europe). They are the trademark of numerous cities, and they will only survive if maintained as a living space.

read more

Task 60
Application of PVT Collectors and New Solutions in HVAC Systems

This Task will focus on the application of PVT collectors with the aim to assess existing solutions and to develop new system solution principles in which the PVT technology really offers advantages over the classical "side by side installations" of solar thermal collectors and PV modules.

read more

Task 61
Integrated Solutions for Daylighting and Electric Lighting

Lighting accounts for approximately 19% of the global electric energy consumption. Research and development in the field of energy efficient lighting techniques encompassing daylighting, electric lighting and lighting controls potentially can contribute significantly to reduce this demand.

read more

Task 62
Solar Energy in Industrial Water & Wastewater Management

This Task will develop and provide the most suitable and accurate information on the technical and economical possibilities for effectively applying solar thermal energy and solar radiation to disinfect, decontaminate and separate industrial process water and waste water.

read more

HPT

Heat pump technology (HPT)

The IEA Heatpumping Technologies is a non-profit organisation through which participants in different countries co-operate on projects in the field of heat pumps and related technologies, such as air conditioning, refrigeration and working fluids (refrigerants). consumption for the benefit of the environment.

www.heatpumpingtechnologies.org

Annex 50
Heat pumps in multi-family buildings for space heating and DHW

The overall aim of this Annex is to increase the use of heat pumps in multi-family buildings. The main objective is therefore to demonstrate possible energy savings and the utilisation of renewable energy by means of heat pumps in buildings retrofitted with heat pumps without improving the building envelope.

read more

Annex 52
Long term performance measurement of ground-source heat pumps

Annex 52 will focus on surveys and creation of a library of quality long-term measurements of ground source heat pump (GSHP) system performance for commercial and institutional buildings.

read more

Annex 54
Heat pump systems with low GWP refrigerants

This annex aims at promoting low GWP refrigerant application to accelerate phase down of high-GWP HFCs by developing design guidelines of optimized heat pump components and system for low-GWP refrigerants through the review of available low-GWP refrigerants, their properties and applicable standards, safety and flammability of refrigerants, and safe use of flammable refrigerants.

read more

Annex 55
Comfort Climate Box

Annex 55 aims to accelerate market development of Climate and Comfort box solutions. The technical challenge is the smart combination of different technologies in one system. Specialists from various fields of technology are required, and need to cooperate in order to accelerate product development and market introduction of combined heat pump / storage packages: The Comfort and Climate Box (CCB).

read more

Annex 56
Internet of things for heat pumps

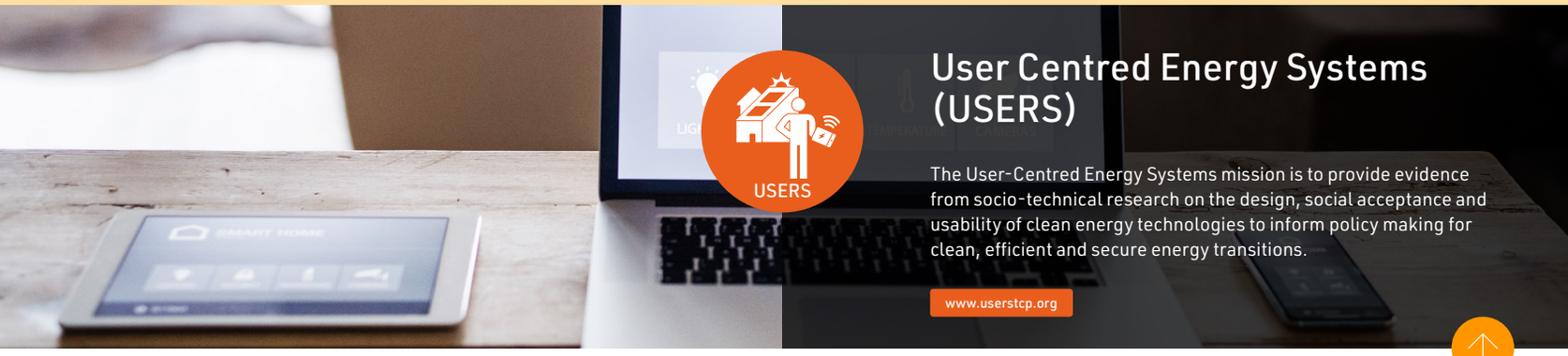
The IoT Annex focusses on the opportunities and challenges of IoT enabled heat pumps. Connected devices will play a major role in the future addressing multiple aims, such as increased comfort for the user, reduction in energy consumption and decarbonization of heat supply. The Annex will include both, heat pumps for household and commercial applications and heat pumps for industrial applications.

read more

Annex 57
Flexibility by implementation of heat pump in multi-vector energy systems and thermal networks

This proposed Annex will focus on the implementation of heat pumps in district heating and cooling systems and describe possible solutions and barriers for heat pumps on these markets. Main focus points are: the creation of flexibility in thermal networks and electrical grids, increasing shares of renewable energy and excess heat, reduction of CO2 and minimizing system losses.

read more



User Centred Energy Systems (USERS)

The User-Centred Energy Systems mission is to provide evidence from socio-technical research on the design, social acceptance and usability of clean energy technologies to inform policy making for clean, efficient and secure energy transitions.

www.userstcp.org

Annex 27
Global Observatory on Community Self-Consumption and Peer-to-Peer Energy Trading

The Global Observatory is a forum for international collaboration to understand the policy, regulatory, social and technological conditions necessary to support the wider deployment of peer-to-peer, community self-consumption and transactive energy models.

read more

Annex 28
Social license to automate DSM

The Social License to Automate Annex investigates the social dimensions of user engagement with automated technologies in energy systems to understand how end-user trust to automate is built and maintained in different jurisdictions and cultural settings. The Annex seeks to understand the dynamics of trust and related social dimensions which determine user engagement with automation technologies in demand side management.

read more

Annex 29
Hard to reach energy consumer

This international research collaboration focuses on a very distinctive audience segment, the hard-to-reach (HTR) energy users, and how to better motivate and engage them in energy efficiency and demand-side interventions geared at changing their energy-using behaviours. The research facilitates the development of robust social science-based process for designing policies, pilots and programmes (e.g. national, municipal, utility- and community-driven) that are better tailored to specific HTR audiences and specific behaviours.

read more

Annex 30
Energy sector behavioural insights platform

The Energy Sector Behavioural Insights Platform brings together government policy makers and other experts to share knowledge and experiences applying Behavioural Insights to energy policy. The overall aim of the Task is to improve the efficacy of demand-side energy policies by ensuring that human behaviour is accounted for at all stages of the policy cycle.

read more

Annex 31
Empowering all: Gender in policy and implem for achieving transitions to sustainable energy

The Gender & Energy Task will gather researchers from the fields of gender and energy in a global network to analyse energy policy and technologies from gender perspectives and provide recommendations for policy design and implementation.

read more

Energy in Buildings and Community (EBC)

The IEA (International Energy Agency) Energy in Buildings and Community (EBC) programme carries out research and development activities targeting near-zero energy and carbon emissions in the built-up environment. These joint research projects focus on energy-saving technologies and activities that support technology application in practice. The results are also used in the formulation of national and international energy conservation policies and standards.

www.iea-ebc.org

Annex 69

Annex 70

Annex 71

Strategy and practice of adaptive thermal comfort

To achieve close to net zero energy use, all buildings will need to be more efficient and optimised. Since new buildings are already well insulated in most industrialised countries, the focus is shifting to limiting space-heating energy consumption by reducing ventilation demand.

read more

Building energy Epidemiology

Building energy epidemiology is the study of energy demand to improve the understanding of variations and causes of differences within an energy-consuming population. It considers the complex interactions between the physical and engineered systems, socio-economic conditions, and individual interactions and practices of occupants.

read more

Building energy performance assessment based on In-situ measurements

Better prediction, characterization and quality assurance of actual building energy performance is essential to realise the anticipated worldwide energy reductions in buildings and community systems.

read more

Annex 72
Assessing life cycle related environmental impacts caused by buildings

The overall goal is to support planning processes and decision making related to new buildings and retrofit of existing buildings to reduce the primary energy demand, greenhouse gas emissions and other environmental impacts along the entire life cycle of buildings.

read more

Annex 74
Competition and Living Lab Platform

This Annex provides the institutional and organizational framework for the Energy Endeavour initiative. The 'Energy Endeavour' initiative creates the opportunity to use the lessons learned from the Solar Decathlon international student team competitions worldwide for its continuous, professional evolution, as well as extending the format with new competitions and a series of networking events under a common umbrella.

read more

Annex 75
Cost-effective building renovation at district level

This project aims to clarify the cost-effectiveness of various approaches combining both energy efficiency measures and renewable energy measures at the district level. At this level, finding the balance between renewable energy measures and energy efficiency measures for the existing building stock is a complex task and many research questions still need to be answered.

read more

Annex 76
Deep renovation of historic buildings towards lowest possible energy demand

Completed examples have shown that reducing the energy demand by 75% may be possible for historic buildings while preserving their heritage value. A considerable reduction in demand – together with optimised use of passive solar design – opens up the possibility of proceeding with an effective solar contribution towards a net zero energy building (NZEB).

read more

Annex 79
Occupant-centric building design and operation

The purpose of this project is to provide new insights into comfort-related occupant behaviour in buildings and its impact on building energy performance. An open collaboration platform for data and software is being created to support the use of 'big data' methods and advanced occupant behaviour models.

read more

Annex 81
Data-driven smart buildings

The purpose of the project is to help harness the emerging digital technology revolution to both reduce energy use in buildings, and to enable buildings to participate as distributed energy resources in support of increased use of variable renewable electricity sources. The project achieves this through developments in 'Software as a Service' innovation and intelligent data-driven building automation.

read more

Annex 82
Energy flexible buildings towards resilient low carbon energy systems

The energy flexibility of a building is its ability to manage its demand and supply according to local climatic conditions, occupant and operator needs and energy network requirements. This project aims to investigate the aggregated potential of energy flexibility services from buildings, demonstrate flexibility through simulations, experiments and field studies.

read more

Annex 83
Positive Energy Districts

The basic principle of Positive Energy Districts (PEDs) is to create an area within the city boundaries, capable of generating more energy than consumed and agile/flexible enough to respond to the variation of the energy market. Annex 83 is developing an in-depth definition of PED and technologies, planning tools and planning- and decision-making process related to positive energy districts.

read more

Annex 84
Demand Management of Buildings in Thermal Networks

This project focusses on successful activation of the demand management of buildings in thermal networks. The project is investigating both the social and technical challenges and how these can be overcome for various building typologies, climate zones and local conditions, as well as how digitalisation of heating demand (real-time data from smart meters) can speed up the activation process.

read more

Annex 85
Indirect Evaporative Cooling

This project will carry out deep and wide investigations of indirect evaporative cooling systems, as well as for cooling towers, including cost, space, maintenance, and environmental impacts (noise, legionella and so on) to find out the main reasons why indirect evaporative cooling technologies have not been widely used. Through field testing real-world running data will be obtained.

read more

Annex 86
Energy Efficient Indoor Air Quality Management in Residential Buildings

The project aims to improve the energy efficiency of the indoor air quality management strategies in operation and to improve their acceptability, control, installation quality and long-term reliability. Metrics will be selected to assess energy performance and indoor environmental quality of an indoor air quality management strategy and study their aggregation.

read more

Energy Efficient End-use Equipment (4E)

The aim of the 4E TCP is to promote energy efficiency as the key to ensuring safe, reliable, affordable and sustainable energy systems. As an international platform for collaboration between governments, the 4E TCP provides policy guidance to its members and other governments concerning energy using equipment and systems. The 4E TCP prioritises technologies and applications with significant energy consumption and energy saving potential within the residential, commercial and industrial sectors (not including transport).

www.iea-4e.org

EMSA
Electric Motor Systems Annex

The Electric Motor Systems Annex (EMSA) focuses on developing and disseminating best practice information worldwide, participating in and supporting the development of internationally aligned technical standards and providing input for the design and implementation of national policies to improve the energy performance of new and existing motor systems.

read more

SSL Annex
Solid State Lighting Annex

Lighting accounts for 16.5% of global electricity end use, and SSL technology has the potential to cut lighting electricity consumption by half. The SSL Annex covers all key areas related to SSL technologies: regulation, advice and market enforcement. The work complements academic research, international standardisation and R&D work in industry, since it is policy-driven with a focus on how to best implement policy and standards.

read more

EDNA
Electronic Devices and Networks Annex

Connecting a device to the internet has an energy cost as well as an energy benefit which is derived from "digitalisation". The intelligence derived from this can be harnessed to optimise a device's operation – decreasing energy use as well as providing "demand flexibility" functions for the energy grid. It is in this context that EDNA provides policy guidance to its members, focussed on facilitating the energy benefits of digitalisation whilst minimising the energy costs.

read more

PECTA
Power Electronic Conversion Technology Annex

The Power Electronic Conversion Technology Annex (PECTA) investigates the efficiency potential of new semiconductor technologies in power electronic applications. PECTA is particularly focused on wide bandgap semiconductors (WBG) based on siliconcarbide (SiC) and gallium nitride (GaN) materials. PECTA is a unique initiative, serving as an independent knowledge and exchange platform for policy makers and experts exploring the efficiency potential from the integration of existing and emerging WBG technology applications in different sectors.

read more

Decarbonization of cities and communities (CITIES)

Cities face extensive challenges when it comes to transformation of their energy and transport systems, such as the creation of suitable decarbonisation strategies. While solutions are often provided at a strategic level, decisions at the urban scale can have substantial impacts on individual approaches and technologies. This TCP builds forth on research done by the 'Working Group on Cities and Communities' (WGCC) of the EBC TCP by continuing to share (provide and gain) information between multiple IEA TCPs and cities with a bidirectional approach.

www.iea-ebc.org

About this infographic

This infographic is intended to provide an overview of relevant research projects in various IEA programmes within the scope of activities of TKI Urban Energy (Top consortium Knowledge and Innovation on Urban Energy). The TKI aims to strengthen the position of companies and stimulate research organisations in expanding their knowledge position. This will lead to an improved (international) economic competitiveness and will strongly contribute to the challenges of the energy transition in the built environment and infrastructure by providing innovating solutions.

About TKI Urban Energy

TKI Urban Energy stimulates the development of innovations for a sustainable, reliable and affordable energy system in the built environment. Under the banner of the Top Sector Energy, TKI Urban Energy supports innovators in forming partnerships with small businesses, larger companies, research institutes, universities, potential customers and other stakeholders active in the energy innovation sector. We are committed to a carbon neutral built environment in The Netherlands by 2050.

TKI URBAN ENERGY
Topsector Energie

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