

Table 1 - Network Partners, Affiliation, Competencies, Activities and Resources

Participants	Affiliation	Competencies	Activities	Resources
Wales (Country) 1 (Partner's No.) NEDO (Ref.)	School of Engineering, Cardiff University	The School of Engineering achieved a 5 rating, the highest numerical grade in the UK University Research Assessment, has 58 academic staff with 6 engaged in thermoelectrics. Prof. DM Rowe leads an established thermoelectric research group, published over 200 research papers, author/co-author of 4 books, editor of the definitive text on thermoelectrics in the CRC Handbook	Material preparation bulk and thin films. Functionally/segmented thermoelements, transport measurements module fabrication and testing, thermoelectric modelling of materials and modules.	Three well equipped laboratories dedicated to thermoelectric material preparation, single crystal, compaction. Transport measurement facilities, class 1000 clean room packing facilities etc. Module fabrication and evaluation at low and high temperatures
Sweden 2 KTH	Kungi Tekniska Hogskolan (Royal Institute of Technology)	Prof. Mamoun Muhammed, Head of Division of Material Chemistry within the Department of Material Science and Engineering, 120 staff. Leads thermoelectric activities, has 6 Post doctoral – 8 graduate students. During past 5 years the group has produced 18 patents, more than 60 presentations and 120 conference presentations and invited talks.	Main topics are inorganic material chemistry and selective separation techniques. Recent efforts have been directed towards synthesis of nano structural materials.	Well equipped laboratories with various facilities and instruments for material synthesis, processing and characterisation including mass spectrometer BET surface area, zeta potential and particle size analysis. Scanning electron microscope.
Denmark 3 UA	University of Aarhus	The thermoelectric group located in the Dept of Chemistry is comprised of 6 researchers led by Dr. Bo Brummerstedt Iverson who has a diverse scientific background with a strong foundation in diffraction techniques to study molecular structure – charge distribution. The 1999 recipient of the Royal Danish Academy of Sciences and Letters silver medal.	Material synthesis and structural characterisation.	Well equipped laboratories for material chemistry. Number of various furnaces and state-of-the-art equipment for characterisation of solids
Sweden 4 CUT	Chalmers Tekniska Hogskala (Chalmers University of Technology),	2445 staff are employed in CUT, 48 researchers in the Dept of Applied Surface Chemistry. The thermoelectric group is led by Dr. Anders Palmqvist, assistant professor, who has worked on synthesis and recharacterisation of colloidal and nano structured materials. Has collaborated closely with Jet Propulsion Laboratory, California.	Synthesis and characterisation of colloidal and nano structured materials quantum confined structures.	Structural analysis (X-ray diffraction, SEM, high resolution optical microscope). Determination of oxidation states by XANES and local structure by EXAFS
Spain 5 CIDETE	CIDETE Ingenieros	European leader in module sales with access to manufacturing facilities in China. The CIDETE company is managed by German Noriega, has 8 people in his office and 10 more on a sub contract basis.	Application of thermoelectric materials for generation and cooling module applications.	Facilities for production of prototype thermoelectric generator and cooling units. Network with module suppliers and industry
Italy 6 CNR	Consiglio Nazionale delle Ricerche (Insituto di Scienze e Tecnologie Molecolari ISTM)	Dr. Carlo Gatti leads a team of 5 researchers. His scientific background is in theoretical and computational chemistry. He is the author of TOPOND-98 a computer code implementing the quantum theory of atoms in molecules to periodic systems. His code is distributed world-wide in more than 30 scientific laboratories.	Support in theoretical and computational chemistry. Focuses on modelling of nano and molecular systems including nano electrons, nano tubes/wires, nano structural thin films.	Variety of computational resources, single crystal X-ray diffractometers (CCD smart Apex detectors) Liquid helium cryostats for X-ray and EPR spectroscopy
Germany 7 DLR	German Aerospace Centre (The National Research Centre for Aeronautics Space and Energy Technology)	DLR has 4300 employees. The thermoelectric group of 11 staff is led by Dr. Ekhard Mueller who has been working for more than 10 years in the preparation, characterisation and modelling of thermoelectric materials. Involved with development of thermoelectric IR detector for the CASSINI mission.	Thermoelectrics sensors – material preparation contact evaluation transport measurements. Thermo generator for terrestrial use has been developed, prototyped and tested for industrial customs.	Well equipped laboratories for material preparation and thermoelectric property measurement. Processing, characterisation and performance tests.
Germany 8 LI	Leibniz Institute of Solid State and Material Research	The Leibniz Institute has a staff of 350 devoted to fundamental research. Dr. J. Schumann who leads the thermoelectric activities has an established track record in thin film and nano structures research.	Thin films preparation of Heusler and Half Heusler alloys with semimetallic and semiconducting behaviour respectively. Valance band engineering. Influence of interfaces and surfaces/size effects in artificially layered structures.	Sputtering, magnetron sputterer. Electron beam evaporation, substrate cleaning, wet etching, electron beam lithography, characterisation of thermoelectric properties and thin films.
England 9 WU	Warwick University	Led by Prof. Terry Whall who in 1987 was the first to suggest that low dimensional structure may have enhanced thermoelectric properties. His group has carried out the most comprehensive investigation of carrier transport in the SiGe 2DHGs.	Design, processing and fabrication of strained layers, multiple quantum wells, device processing. Theory of Seebeck effect.	State-of-the-art MBE growth facilities. High resolution TEM, ultra low energy SIMS.
France 10 EDM	Ecole des Mines	The Lab de Physique des Materiaux has a staff of 44. Research activity led by Prof. H. Scherrer involves 12 staff members. This group has excellent relationships with many thermoelectric labs in the former soviet union. Prof. Scherrer is co-founder of the European Thermoelectric Society.	Theoretical calculations, preparation of bulk and thin film material by Laser ablation. Transport properties measurement	A full range of equipment for material preparation and MBE sputtering, including all transport measurements. Assessment Moessbauer spectroscopy, ESCA, and many others

Table 1 continued

Austria 11 VUT	Vienna University of Technology	The Institute of Solid State Physics at Vienna University was formed in 2002 by the merger of two institutes, one of which is the Institute of Experimental Physics. The Institute is comprised of 35 staff and the thermoelectric group led by Dr. Ernst Bauer is comprised of 5 researchers.	Application of high pressure (100k bar) and magnetic fields (pulsed 40T) on the thermoelectric properties. Preparation of single crystal and polycrystal.	Facilities for applying high pressures and magnetic fields during measurement of thermoelectric transport properties. Pulsed magnetic field installation. Moessbauer spectroscopy, liquid helium plant.
Spain 12 UPC	Universidad Pontificia Comillas	The Institute of Research and Technology is located within the School of Engineering of UPC. The academic staff numbers 107. The thermoelectric group led by Dr. Miguel Sanz-Bobi is comprised of 4 academics	Module configuration analysis for optimisation of cooling and generation analysis of heat transfer. Construction of prototype thermoelectric devices	Heat transfer and fluid dynamics laboratory, facilities for testing cooling and generating modules, sensors and devices
England 13 IC	Imperial College	The premiere engineering department in the UK with a 5A star rating. Combustion/thermoelectric activities led by Prof. Felix Weinberg. Research into aspects of combustion physics and development of advanced combustion methods. Prof. Weinberg has received numerous international awards including the Rumford medal and Intalgas prize.	Interfacing of combustion systems powering thermoelectrics, in particular improvement in system performance employing pre-heating of fuel.	Well equipped combustion laboratory
Spain 14 UN	University of Navarra	The Machine and Thermal Engines Sub-department has 20 staff members. The thermoelectric group led by Dr. Jesus Estarte San Martin is comprised of 6 researchers.	Analysis of performance of thermoelectric devices. Design of heat dissipation systems	Well furnish thermoelectric laboratory, Peltier pellet tester, controlled environment chambers. Manufacturing laboratory
Holland 15 KEMA	KEMA	KEMA previously was the central laboratories for the Dutch Utilities. It employs 1,600. One of its divisions, Kema Power Generation and Sustainables. One activity is the manufacturing of thermoelectric conversion elements.	Non destructive testing, physical and chemical analysis, thermal process simulation, efficiency measurements, reliability, market and applications research.	All resources which accompany an extremely large laboratory.
France 16 UOM	University of Montpellier	Thermoelectric group led by Prof. J.C. Tedenac, Head of LPMC laboratory. Four permanent staff members engaged in thermoelectric research.	Thermodynamic calculations phase diagram modelling Nano structured materials	Well equipped chemistry of materials laboratory with specialised material preparation equipment
Holland 17 DUT	Delft University of Technology	Within the University is the Institute of microelectronics and submicron technology (DIMES). The Department employs about 30 scientific staff and 50 supporting staff. Dr. Wolffebuttel leads the thermoelectric activity with focus on design and fabrication of integrated on-chip data acquisition systems.	Development and fabrication of integrated Peltier elements for thermal stabilisation	State-of-the-art instrumentation for measurement on-chips. Facilities for fabrication and micro-machinery in silicon and micro-systems. A new 2000m. sq. clean room
England 18 CU	Cambridge University	Cambridge University is a centre of excellence in the UK and has 4359 academic staff. Thermoelectric involvement centres around the Polar marine Science Group led by Prof. Peter Wadhams. His current interest in the development of thermoelectric power sources for use in monitoring global warming through changes in ice patterns. The group leader is a recipient of many international prizes.	Interfacing thermoelectric power resources with a wide range of novel instrumentation for use in arctic engineering, e.g. strain gauges, wave buoys and tracking ice movements	Access to full range of research laboratories and technical back-up.
England 19 COG	Cogent UK	A UK company owned by EADS Telecom. Employs 450 staff involved in telecommunications, civil and military. 8 people tasked with power and cooling issues.	Thermoelectric involvement in thermal control of equipment used by European joint Rapid Reaction Force	Well equipped modern electronic laboratory in part testing/interfacing thermoelectric devices with a range of electronic equipment requirements.
Germany 20 UOU	University of Ulm	A well established University with 865 full-time staff, members of which 182 are professors and 205 part-time staff. In Engineering Sciences. there are 88 staff. Thermoelectric activity will be led by Prof. Friedman Voelklein	Well equipped international expertise in fabrication of thin film structures and devices. Proven track in micro-sensor technology.	Well equipped laboratory for micro-device fabrication and performance testing.
Iceland 21 UOI	University of Iceland/Varmaraf	This is a partnership established between the University of Iceland and Varmaraf, which is anew business venture fund. Thermoelectric activities is lead by Professor Thorsteinn Sigfusson.	Extremely active in the thermoelectric utilisation of the large quantities of geothermal heat which is available. Electrical power derived from this "waste heat" is distributed to isolated houses and greenhouses remote from geothermal wells. Active production of hydrogen.	Well equipped laboratory for construction of prototype/demonstration applications of thermoelectric generators up to 2kW.
Czech Republic 22 UOP	University of Pardubice	Thermoelectric materials are studies in the Faculty of Chemical Technology by 3 collaborating groups – inorganic chemistry, joint laboratory of solid state chemistry and the physics department, each led by a professor. Activities co-ordinated by P.Lostak and L. Koudelka	Doped and mixed ternary tetradymite type single crystals, also quarternary crystals doped with transition metals and rare earth. Skutterudite type materials also studied.	X-ray diffractometer electron microscope with microanalyser. Atomic absorption spectrometry facilities for determination of temperature dependence transport properties (77-400k)