

PUBLIC INVESTMENTS IN EDUCATION AND ENERGY TRANSITION IMPACTS ON CEE/GERMAN TRANSFORMATION

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1. Abstract

A focus on higher education has reaped very large dividends for our countries. As an important step energy transition for future generations needs better education for an efficiency increase. Based on CEE/German¹ transformation, process actual investments in renewable energy (RE) sector offer great economic and global potential as a growth sector². But impacts of the financial crisis complicated decisions and implementation of public investment projects³. In this paper we examine two energy case studies based on the challenges of an energy transition implications for public/private investments and impacts on regional/global sphere: Desertec first example of a comprehensive approach: expanding the production of electricity from solar thermal power plants in Europe, North Africa/Middle East and transmission networks. Second example as best practice case is bioenergy: business development and implementation of public/private SME-project. Based on Miika assessment of education and energy investments, we finally consider financing of SMEs and RE.

Keywords: Energy transition, global development and public investments, CEE-Transformation process and renewable energy (RE) sector, EU-MENA; energy- solar/thermal power, Sustainability, Financing RE, SMEs and business development.

2. Introduction - Education, Earnings and Productivity

Actual budgetary constraints and a critical public complicate the implementation of public projects. But public investments in infrastructure, education, require political success, transparency/ accountability⁴. Based on experiences in CEE/ Germany this paper examines evidence on the impact of public investment on economic growth, human capital development and productivity. As we try to identify policies being made increasingly at Community, national, regional and global strategies addressing specifically education sector/themes: Designing methods and using evaluation of regional policy as well as methods and techniques for the analysis of sustainable development we will discuss (eg, employment, etc.). Assessment in the context of sustainable development: Evaluation standards and ethical issues. Modern economics recognize the relevance and *Contribution of Education to Economic Growth. Also Supporting improvements in welfare: Reducing Poverty, Inequality and Social Cohesion*⁵. Public funding accounts for the majority of university income across Europe. In Germany, financing of higher education is mostly the responsibility of state authorities, the federal government has increased investments to support the financial security of German higher education and research institutions⁶.

These investments will provide an additional € 800 million under the renewed higher education pact which will support growing student numbers until 2015. The federal government will also invest a further € 2.7 bill. 2012/15 into Excellence Initiative and provide an increase of 5% for Research Pact.

Democratization and globalization of higher education, both the number of students and the proportion of young people studying abroad increased affecting the balance of power in the higher education sector and strategies for students, universities, governments and companies. In a report on the impact of the economic crisis on national higher education systems in Europe, the EUA refers to the increasingly difficult situation faced by European universities. Many governments have made significant cuts to public funding of higher education and there are growing fears in other countries cuts are likely to follow in coming months. France increased its overall higher education funding by investing almost EUR30 billion this year into key priority areas. From this, EUR11 billion will be invested to improve the overall quality of higher education, EUR8 billion will go towards developing research while the remaining funds will be used to create new university campuses of excellence or towards restructuring existing ones. The economic crisis has, in some countries, fostered a public debate on private contributions to higher education.

Discussions are taking place on the introduction or increase of tuition fees to help universities reduce the funding gap created by the decreasing levels of public funding. *"The impact on other types of private funding is less clear for now as data are more complex to collect and analyse. Although EUA's monitoring showed no direct impact on current collaborative projects between universities and industry, individual accounts from Austria, Belgium, Finland, Germany, Netherlands, Norway, Portugal and Switzerland have highlighted some difficulties in starting new projects."*⁷ Across Europe organizational autonomy of public universities deciding on own internal governance structures; on their internal authority, responsibility and accountability structures; as well as to select their institutional leadership is still restricted in many countries by national legislation, regulations and guidelines. Only a few countries have implemented reforms that have transferred to the universities the power to decide on their internal governance structure. Cooperation with universities and research institutions is a crucial success factor for successful innovations in turn as key drivers of economic growth and thus ensure social welfare. The successful implementation of innovation in marketable products and processes requires resources and personnel in research and development, also highly qualified employees in all departments to implement first technical innovations in the company itself. Also demographic trends further increasing technological needs even larger.

3. Global developments and public investments

Actual Era of globalization and ethical questions win with globalization at weight and demanding for a new value system and better control structures. But Globalization

began decades before in 19th century, stimulated by technological advances, liberal trade, remarkably free movement of people, and almost entirely free movement of capital. The world also enjoyed an unprecedented rise in prosperity: Economic history shows us real GDP per head rose at a rate of 1.3 percent a year in the world as a whole between 1870 and 1913. WWI and II ruined the first globalization. Breaking with the old system of regulated financial operations and control over capital movement since the crisis of 1929 - WWII financial globalization is dominating the majority of national systems. Globalization is a most debated topic in international economics. Growth in China, India, poor 20 years ago, are positive aspects of globalization.

Based on Public choice, theory using of economic tools dealing with traditional problems of political science: Models voters and politicians- interactions in the social system either as such or under alternative constitutional rules utility maximization, decision/ game theory initiated research on how politicians' self-interest and non-economic forces affect government economic policy⁸. Economic sound assessment of public investments for public investments to comply therefore no longer purely strategic or political arguments Based on experience we evaluate public projects and possible financing for analysing relevant markets with respect all key performance parameters⁹. Development defined as “process of economic and social transformation based on complex cultural and environmental factors and interactions”. We use it in the scope of economic development including the process and policies by which nations improve economic, political, and social well-being of its people. Modern economies recognise the importance of a strong public science base to support improvements in welfare. The outputs we get from the science base, which include new knowledge, skilled people, new methodologies and new networks, have contributed to improvements in the things that matter to us, such as our wealth, education, health, environment, culture and public policy.

Examining recent evidence on the impact of investment on productivity, human capital development and economic growth we conclude: *Infrastructure is basic physical and organizational structures needed for the operation of society and/or enterprise plus services and facilities necessary for an economy functioning: interconnected structural elements that provide framework supporting an entire structure of development. It is an important term for judging a country or region's development.*

Public investments play a crucial role in the development of the national economy infrastructure. It contributes to the promotion of the investments' positive mobility whether productive or services, private or public. Also public investments help reaching higher rates of economic growth between branches and domestic economic activities which leads to the establishment of rules and foundations of the real economy and limiting financial crisis in the economy. All these procedures contribute to the

*gradual reduction of dependency. Sufficient infrastructural network consisting of (but not limited to) roads, water, health services and electricity*¹⁰.

*In a globalized world all face challenges in development as measured e.g. by Human Development Index*¹¹. Historically the development problem is complex: e.g. Access to Credit is one of the most pressing issues that hinder rural population, development problems.¹² *Since launching in 2008 the Global Poverty Project summarizes: "Infrastructure - physical resources like roads, telecommunication networks, schools and drains - is necessary for a society to function: people can't access healthcare if there are no hospitals; trade can't take place if there are no roads on which to transport goods to markets. Infrastructure facilitates the basic functions of a society that are necessary to transport resources and people, produce and trade goods, provide essential services and ultimately reduce poverty."*

Public investments are basis for development: any country having significant natural resources, land, and human capital but without infrastructure will not be able to develop. The World Economic Forum (WEF) ranked most of the world's infrastructure by country in their most recent Global Competitiveness Report: <http://www.weforum.org/issues/global-competitiveness>

World Bank found countries lacking infrastructure are unattractive for foreign investments a vicious circle because public investments are costly, but growth is insufficient, and productivity is reduced by almost 40%⁽⁴⁾. Africa's inadequate infrastructure is a problematic factor for business: roads and distribution of electricity biggest challenges and HDI remains low. Asia experienced rapid growth forming an *Asian Miracle and Modern Growth Theory*¹³.

4. CEE -transformation process and renewable energy (RE) sector:

A complicated transformation process in Central Eastern Europe public investments played a crucial role in the development of the infrastructure. Based on declining investments an enormous negative Infrastructural Development can demonstrated, leading to an enormous decline in living standards: In 1994, the Russian Ministry of Internal Affairs (MVD) estimated that 25% of the Russian gross national income was derived from organized criminal activities. MVD also believed that 5600 criminal groups were involved primarily in capital/money laundering, the drug business, and extortion. President Yeltsin issued the Decree: "*On The Urgent Measures To Defend The Population Against Gangsterism And Other Kinds Of Organized Crime.*"¹⁴; see World Bank WDR 1996: From Plan to Market). Disintegration of the Soviet bloc and the associated end of the Cold War, development of computer and communications technology, global liberalization of trade and finance, global era based opportunities of globalization and economic downturn as well as winners and losers began. But only a global view and collective action can create problem-solving perspectives¹⁵. In 1989/90¹⁶ German unification formed a caesura in German and European history. The *Treuhandanstalt*/Treuhand agency) privatized the East German enterprises owned as public property. Created June 17, 1990, it oversaw the restructuring and selling of

about 8,500 firms with over 4 million employees. At that time it was the world's largest industrial enterprise. Critics on unnecessary closing off of profitable businesses, misuse and waste of funds and unnecessary layoffs arised¹⁷ Economic history shows East German and West German economies at the time of unification looked very similar. They both concentrated on industrial production, especially machine tools, chemicals, automobiles, and precision manufactures.

Germany important export component basis is a well-trained labor force¹⁸. But the East German economy was highly centralized and guided by a detailed and purportedly precise planning system, with virtually no private property and with no room for decision or initiative. On July 1, 1990, the economies of the two Germanys became one. It was the first time in history that a capitalist and a socialist economy had suddenly become one, and there were no precise guidelines on how it could be done. As private funds lagged, and in part because those funds lagged, federal budget investments and expenditures began flowing into eastern Germany at a consistently high rate. Government funds were used essentially for two purposes: infrastructure investment projects (roads, bridges, railroads, and so on), and income maintenance (unemployment compensation, social security, and other social costs). Public infrastructure projects sustained employment levels, and the income maintenance programs sustained income.

A review conducted in 2007 of twelve years of individual employment histories found that, generally speaking, the training of unemployed East Germans was beneficial, but involved initial negative (participants cease to actively seek employment for the first twelve to eighteen months of training) lock-in effects and that long-term retraining for construction was misguided. A precise level of German official expenditures in eastern Germany has been difficult to estimate because funds appropriated in one year might have been spent in another, it is beyond dispute that the federal government expended well over DM350 billion in eastern Germany during the first three years after economic, or monetary, unification. After 1992 this requirement has continued at an annual level of around DM150 billion, so that the sum of private and public funds put into eastern Germany during the half-decade between monetary unification in 1990 and the end of 1995 would probably amount to at least DM750 billion and perhaps as much as DM850 billion. Between one-fifth and one-fourth of those funds were private, and the remainder were government funds. An infusion of DM50,000 for every resident of eastern Germany, a far greater level of assistance than contemplated for any other area that had been behind the Iron Curtain and a token of German determination to bring eastern Germany to western levels as quickly as possible.

Saxony-Anhalt great economic problems in 1990s and massive brain drain, but the trend is turning: Successful companies in the chemical industry, the solar industry and engineering professionals who wish to return. Former East German industrial center

Saxony-Anhalt's economic bottom from 1995 to 2003: Halle 27 percent one of the highest unemployment rates in Europe. After the collapse of the East German collectives, Saxony-Anhalt in the past decade could be successful: New industries and economic priorities - the chemical industry in the south and the food industry in the north - a good supplement. The solar industry has settled in the region of Bitterfeld, that wind power industry to strengthen the traditional engineering in Magdeburg, and businesses across the country came to the car industry. Since the average age of the population has increased in recent years and the population shrinks, now threatens even a shortage of skilled labor, which could slow the economic recovery¹⁹. Among the positive developments are the continuous, substantial growth of the manufacturing sector and the generation of significant industrial clusters in different regions. Overall the structural progress of East Germany's economy during the past decade is quite remarkable: manufacturing sector is growing. In particular in Saxony-Anhalt manufacturing has expanded rapidly and new industrial clusters have emerged. With the continuing convergence of the economic structure it becomes more and more likely, that East Germany will have developed a viable economy when the federal "solidarity pact" transfers expires in 2019. Also pressing problem is the country's finances. Although the federal government to increase the budget of Saxony-Anhalt - from the Solidarity Pact II flow from 2005 to 2019 a total of 25 billion €²⁰.

5. Public investments into education/ energy transformation

Emerging in Germany and elsewhere, university research is leading to direct participation in the process of industrial development. Economic stimulus and growth, the essential step, therefore, is to step up public investment in research and development. We believe that universities will, and in fact must, collaborate as they confront pressing global problems that no single institution, and no national network of institutions, can hope to solve alone. The member countries of the European Union consume a lot of energy, but their production capacity is not sufficient to cover their needs²¹. Solar thermal energy from Africa (Freyer, 2002...) would be a perfect complement to the German energy mix, because wind, the most important source of renewable energy in Europe, is unreliable, whereas the sun shines consistently in Africa. But Desertec project would require cables to bring the electricity to European population centers. The cables would be high-voltage direct current (HVDC) transmission lines, which can transmit electricity over a distance of 1,000 kilometers with losses of less than 3 % and costs are enormous. The 200-kilometer cable that will connect the Bard offshore wind farm in the North Sea to the German grid will cost about €300 million. Some 80 to 100 of these cables would be needed to bring all the electricity.

DESERTEC claims will be generated in the Sahara from Africa to Europe. Desertec companies also hope that a country like Italy, which is hardly likely to meet its climate target set by the EU, could reduce its environmental footprint with clean energy from Africa²² **Also interesting is Desertec University Network founded, an International**

science cooperation for clean power from deserts: <http://www.dii-eumena.com/home/news-single/article/90.html>; <http://www.desertec.org/de/stiftung/>; <http://www.sonnenseite.com/News,80.html>, source: <http://www.dii-eumena.com/>

- *Founders: The DESERTEC Foundation together with 18 universities and research facilities*
- *The local education of qualified specialists is a key aspect for DESERTEC*
- *Future plans are to extend the network to a global platform*
- *It's next to the industrial initiative Dii GmbH another pillar of the DESERTEC Foundation's strategy*

In 2011, total RE investments in developing countries reached USD 89 billion; an 10% increase in their value compared to 2010. China top :USD 52 billion in RE investments and a 17% growth rate for 2012 (United Nations Environment Programme (UNEP) and Frankfurt School (FS), 2007-2012).

“Solar energy has also been on the rise in recent years, with substantial investment in the sector. This trend should continue, driven by national policies and the on-going decrease of the cost of PV technology. The average retail price of a solar module in 2001 was USD 5.4 per Wattpeak (Wp)8. By November 2011, the price had fallen to USD 2.49 per Wp, amounting to a decrease of 53.8%9; and in 2011, solar PV attracted twice as much investment as wind energy worldwide”. IRENA 2012, p.24 . “Biomass and waste-to-energy projects, ad biofuels, comprised an important part of total RE investments in developing countries“. ”IRENA 2012, p.24

The density of industrial companies in the photovoltaic region Thuringia, Saxony and Saxony-Anhalt is unique. Pioneering and entrepreneurial spirit, above average qualified and motivated staff and the Policy support at the state and federal level have central Germany for outstanding region photovoltaics.

Cluster Solar Valley Central Germany is organized in the High-Tech Strategy of the Federal Government Solar Valley Central Germany, winner of the nationwide competition, as the top cluster of the Federal Ministry of Education and Research (BMBF). Center of the joint efforts is Solar power becoming competitive. This is achieved in an ambitious strategy plan in which the economy, science and Education closely to achieve the common goal of working. we are convinced that the concept of Solar Valley is to set the course for a change in the energy strategy and establish photo voltaics as energy technology of 21st century²³.

See <http://www.solarvalley.org/blick> and http://www.solarvalley.org/imagevideo_bmbf

Formation of a Mediterranean Union a high strategic importance of for the European Union especially in terms of energy security. German-Algerian Joint Economic Commission first meeting on 08th and 09 Met in March 2011 in Berlin. Both countries are also the Desertec project for the development of solar and wind energy, including from Algeria, pay special attention.

2011 the federal government decided the 6th Energy research program "Research for Environmentally friendly reliable and affordable energy supply." In our research project are to economics results for an energy transition from the project "Desertec Industrial Initiative (Dii), Solar Power from the Desert" will be analyzed in the context of "Solar Valley Central Germany" and concomitantly an expertise for international cooperation in these fields will be sought. DESERTEC as our research project: Electricity from deserts will soon be making a growing contribution to supplying the people of North Africa and the Middle East. And current will flow to Europe from solar and wind energy in the deserts even within the next decade. In this way, he will help to ensure that all 27 EU countries can achieve by 2020 its ambitious targets. But which plants produce electricity for the future German consumers and businesses? To what extent the development of renewable energy can be an experience transfer with MENA countries economically-sensible, worthy of investigation. Research Basics: foreseeable shortages of fossil fuels must be addressed with intelligent strategies for the future. In the long run only a broad range of measures will enable the security of energy supply. Diversification of energy sources and technologies, as well as mobilization of all conservation reactivation and efficiency-enhancement strategies are required. Closely linked to the energy sector, global challenge of climate change in coming years, many steps are taken to mitigate climate change.

Desertec founding partners (ABB, German Bank, E.ON, Munich Re, RWE, SCHOTT Solar, Siemens ...) stand for sustainable business activities to contribute to sustainable energy supply.

“Key examples of infrastructure challenges include system constraints, lack of grid access, high grid connection costs, limited grid capacity and coverage, lack of technical standards and certification, and lack of operation and maintenance facilities (World Economic Forum, 2011). Construction and financing of new transmission networks will continue to be a barrier as capacity increases. In many developing countries, the best RE resources are located in areas that are far from the national transmission grid and/or are not well serviced with other forms of basic infrastructure, such as roads”.(IRENA²⁴ report 2012. P.17)

Aspects of European countries and Mediterranean countries and the gulf co-operation countries coming together, in order to establish a green energy market.

It concerns solar energy and wind energy primarily naturally all kinds from renewable energies. Also integrating electricity markets and creating energy efficiency the population in North Africa needs power particularly with cooling systems. A win-win situation can be based on know-how and expert's assessment and the Mediterranean countries participation²⁵. Creating infrastructure for additional capacities between the European Union and southern Mediterranean countries brings innovation and scientific research. Next comes: Diversification of the sources of energy and technologies as well as mobilization of all saving, reactivation and efficiency

increase strategies. With the energy sector the global challenge of the climatic change is closely linked.

An analysis of the market potential is as important as the question of who comes as a future buyer of the electricity in question. The recoverable payments in Europe for solar energy could act in this way as financing levers for more investments in North Africa. At which locations can be generated with which technology and at what cost? Economic and social development potential for the MENA region and Central Germany: a success factor for the implementation of the Desertec vision will be the analysis and ascertainment of the benefit that the potential producers of electricity from the desert have become. Economic effects of the expected investments are determined: Desertec has to become visible by developing local industries, by creating jobs and knowledge transfer.

“Knowledge and capacity among various actors involved in the RE finance arena in developing countries are often limited. There is less experience with RE project finance structures, limited equipment operations and maintenance expertise, and a greater need for technology transfer support.

Banks that do not understand RE technologies are unable to assess the project risks in order to make the necessary financing decisions. Project developers often lack experience with business and financial planning, technical expertise, or adequate awareness of funding opportunities. Public administrators often lack the capacity to streamline approval processes or implement RE laws”. IRENA report 2012, P.17 And: “UN Principles of Responsible Investment (PRI), or other initiatives that integrate sustainability considerations directly into the financial decision making process. They can also engage global finance policy groups to include sustainability considerations within the analyses and recommendations of authorities such as the Financial Stability Board (FSB) and the Basel Committee on Banking Supervision, whose policies have a record of successful adoption across the financial sector worldwide”. (IRENA report 2012. P. 21.)

As a nation's competitiveness depends on the education and skills of its people and on the infrastructure connecting them with one another, rather than on the profitability of companies headquartered within it. But private capital is increasingly global and footloose, while its human capital—constituted the one resource on which the future standard of living of a nation uniquely depended: Corporate Social Responsibility and making public investments the cornerstone of economic policy: DLR, 2011: Langfristszenarien und Strategien für den Ausbau der erneuerbaren Energien in Deutschland bei Berücksichtigung der Entwicklung in Europa und global, http://www.erneuerbare-energien.de/fileadmin/ee-import/files/pdfs/allgemein/application/pdf/leitstudie2011_bf.pdf

University education is a transforming process both for individuals and cultures, and universities are primary drivers of the global knowledge economy. Integration with industry builds education as skilled and Innovative Workforce drives economic development²⁶.

SOLARVALLEY CENTRAL GERMANY is leading through co-operation the concentration of photovoltaic (PV) companies in Thuringia, Saxony and Saxony-Anhalt and unique in the world. A pioneering spirit and entrepreneurial courage, highly qualified and motivated employees and support from politics at a national and regional level have made central Germany into an outstanding region for photovoltaics. The industry has formed a cluster called "Solar Valley Central Germany". Within the scope of the German government's high-tech strategy, Solar Valley has been winning the top cluster title since 2008 in the nationwide competition promoted by the Federal Ministry of Education and Research.

A Bright Future in Central Germany, as three German states, one common goal: Solarvalley Mitteldeutschland is the initiative to lead the competition against conventional fuels. The first milestone of grid parity should be achieved by 2013, which means that solar power will be more cost-effective than „power from the socket“. *German Federal Ministry for Education and Research sponsors Solarvalley Mitteldeutschland as a 'cluster of excellence'* - is implemented in 98 individual projects with a total budget of €150 million over a period of 5 years. The public sector - the Federal Ministry of Education and Research and state ministries - are financing 50% of the expenditure. The cluster is led by the production companies which are also responsible for the R&D strategy, the selection of partners and the funding of their share of the costs. The regional network of stakeholders successfully supports this complex and closely interlinked development approach: Development of technology, Education and Cluster management. International cooperation in science and research is a central element in efforts to strengthen and improve Germany's position in the international arena.

The Federal Government's High-Tech Strategy and the Strategy for the Internationalisation of Science and Research provide the basic framework for these efforts. Strengthening long-term cooperation with developing countries in the areas of education, research and development is an important element of the Internationalisation Strategy. The announcement focuses on the initiation and development of strategic partnerships in the field of science and research between German organisations and institutions from the North African and Middle Eastern countries that are members of the Union for the Mediterranean (UfM), including Turkey. In total, the UfM includes all 27 Member States of the European Union as well as 16 countries across the Balkans, Northern Africa and the Middle East, including Turkey . Measures are currently being carried out in the following six priority area - Mediterranean solar energy plan.

Central Germany (<http://www.cleantech-ost.de/>) is an example for the rebirth of an old industrial region. But former world leader Q-Cells is in an insolvency process due to expensive products of solar valley. <http://www.cleantesting.de/energie/china-und-deutschland-wollen-erneuerbare-energien-gemeinsam-ausbauen/>

Future R&D personnel quality, is the most important factor determining choice of location of R&D activities by multinational companies. EU studies showed that for every 1% increase in the population that has access to higher education, the economy grows by 0.7%: an emergence of a Global University by Collaboration to Solve Global Problems for increasing complexity in the 21st century: climate change, political, ideological, cultural, and regional conflicts threatening hopes for global peace and progress²⁷. As the financial crisis in Greece reached its peak, the economic consequences rippled across the European Union and the United States, and then around the world: Substantial state investment in higher education passed, and funding levels 1980s will not return. Many public universities will focus on innovation and entrepreneurship to reduce costs and generate new revenues. A Master Plan for public higher education²⁸, focusing on access to excellence as economic driver and research/innovations from the laboratory and the computer to the marketplace²⁹.

Private investors compete on the basis of financial returns, the highest of which are still found primarily in non-renewable energy production. RE can be economically viable even when it is not financially viable, given that markets are still learning how to adequately account for externalities (the social and environmental costs incurred by conventional energy production) and for the value of long-term success. To ensure a successful and sustainable future, therefore, governments are taking action to encourage and facilitate RE financing. In many developing countries, national policy has already played a decisive role in shaping RE markets so that financiers will find them attractive.

Knowledge and capacity among potential renewable energy financiers are often limited, resulting in increased risks and elevated costs³⁰.

But barriers to RE investment in developing countries span economic, political, legal, technical and non-financial spectrum. For any given RE technology, barriers change as the market for that technology develops (IEA, 2011).

6. Education and economic effects on SME development

Actual energy revolution is an ambitious and sophisticated process³¹: converting to renewable energy control and design the low-CO₂ energy system to meet the climate goals. Resource management is an issue of increasing concern as reflected in its global socio-political frameworks brought integrated nature of environment. Environmental resource management involves managing economic, social, and ecological systems within and external to an organizational entity in order for it to sustain itself and the system it exists within.

As best Practice case study see Bio- energy/mass: *Müka*³²; *annex 2*. Also Müka means democratizing production as its historic basis is on (energy and) agricultural cooperatives³³. As excellence cluster Müka contributes to the sustainability of society to improve the social and cultural quality of life. Especially the selection of a regional biogas project allows significantly innovative aspects, based on the focal points development of renewable energy: Basis is an initiative of students. As Small and Medium-sized Enterprises (SMEs) play an important role in the service sector contrary to the agglomeration tendencies in industrial and agricultural production economies of scale play a less important role in providing services. Many business models in services focus on the individual interaction with customers and their integration in the production process. This type of value creation is very much context-dependent and a great diversity of social, cultural as well as natural resource can be used here to highlight the qualitative value dimension of human co-existence: [http://www.ufz.de/MÜKA GmbH](http://www.ufz.de/MÜKA_GmbH) as a spin-off our University and constructs/operates a 400KW biogas plant.

Basis for Müka biogas plants are animal excreta, energy crops are used as substrate. Enviam AG injected current at which this is required under Renewable Energy Act generated heat and fertilizer released to Ceres Agrar GmbH. Cooperation with regional companies, e.g. VERBIO AG, Leipzig offers perspectives: also GREEN VENTURES is Germany's largest partner- ship forum for energy technology companies in Leipzig, 28. - 30. January 2013³⁴. *Expansion of these distributed systems is not just about new technology and the issue of renewability and environmental friendliness of these energy sources. Socially at least as important is the aspect that these systems tremendous money flows are diverted: the revenue from the sale of electricity to flow back not only to distant consolidated cash, but increasingly in public hands. The cash cycle is closed so comparatively narrow. Operators of these plants are local people. Operation of distributed systems and the production of renewable energy systems - where environmental sense - as well as the network operating relatively decentralized and "citizens in hand" takes place can be prevented that the disposition of these existentially important production sites of the population escapes. And, if new local renewable energy systems are less financed by bank loans, but rather are paid out of current income from the "energy business", then the money goes back to the site's own region . Resources which are not created by humans can play an important role in the creation of human services. Humans profit from a large diversity of resources which are offered by ecosystems. Ecosystem services include clean and relaxing natural environments, green vegetation etc. and are already widely used in services sectors like tourism.*

This structural change in our economies requires new business models: customer is an active co-producer of human services³⁵. Electricity produced from renewable energy follows the wind, biomass: advantage of biomass is its diversity: whether liquid or solid, whether green waste or manure - biomass is stored energy. When burning only as

much CO₂ is released as the plants of the atmosphere have withdrawn. But there is a shadow on this energy: In order to switch from gasoline to biodiesel, enormous acreage for rapeseed, sugar cane or soy would be needed. Bioenergy has been much talked about for many years. The debate often highlights the risk of competition between food and energy production. In addition, critics of bioenergy fear that valuable natural habitats will be lost as cultivation of crops such as maize and rape takes over. How biomass can be used for energy production without detriment to people, nature and the environment is the subject of our feature "Bioenergy –sustainable?"³⁶ Öko-Institut and IFEU on behalf of the Federal Environment Agency: Saxony-Anhalt is becoming a leading region in the field of renewable energy. 3% of the electricity consumed in Germany are produced in biogas plants. But biogas boom for renewable energy based on different approaches, at Merseburg University is an innovative start-up initiative of students has been formed that is - is dedicated to the production and use of bioenergy / gas - starting from the fertile farming region.

A spin-off is the current alternative MÜKA GmbH with the establishment and operation of a 400KW biogas plant on manure and solid manure basis. As an example of companies in the fields the revenues are generated from the remuneration of the current fed into the grid. According Renewable Energy Act, legally required, resulting heat and fertilizer (product from the fermented residue) released; accompanying selected aspects are examined in research-oriented bachelor's and master's theses, eg an economic assessment of the prospects of bioenergy production or implementation of controlling systems in the field of renewable energy³⁷.

7. Conclusions - Future Challenges

In 21 Century we search further for intelligent use of all renewable energies and a concept for living. "RE investors in developing countries include governments, banks, equity firms, insurance companies, pension funds, industry bodies, clean energy companies, and start-up project developers. IRENA report 2012., P.17. Examples of successful financial infrastructure methods to overcome deficits are based on a more efficient financial system, e.g Microfinance³⁸ and SME research on development problems. For solutions to social and international development problems also assistance in computer infrastructure development. Communication technologies to solve development problems are important. A strategy to implement a framework of co-existence of nature, economy and society besides conceptual discussion a critical reflection of business models for SME is becoming more relevant³⁹: e.g. "Ethical rating" (examination and evaluation of financial institutions to social and environmental criteria).

German experience of, and returns from public investments in higher education and business/SME development: Impacts of microfinance institutions on development and growth on micro- SME also public investments on development and growth on micro- SME are also examined: "*..bring the kinds of opportunities and risk-*

management tools that financial services can provide to the doorsteps of poor people and rural finance. Actual ideas like the "Intervention with Microfinance for ...incorporates microfinancing in the financial infrastructure. microfinancing in the financial infrastructure. Global development is most used in a holistic and long-term solutions to problems by developing Knowledge transfer in the fields of organizational development and organizational learning is the practical problem of transferring⁴⁰.

NOTES

¹ Energy transition - *Energiewende*: the transition of Germany and several other countries to sustainable economies by means of renewable energy, energy efficiency and sustainable development. The final goal is the abolishment of coal and other non-renewable energy sources.

² Legislative support was passed in 2011. Important aspects include: greenhouse gas reductions: 80–95% reduction by 2050, renewable energy targets: 60% share by 2050, energy efficiency: electricity efficiency up by 50% by 2050 and associated research and development drive. *For solar investments and Central Germany see <http://www.solarvalley.org/>*

³ "...global financial crisis and economic recession of 2008-2009, followed by the euro sovereign debt crisis of 2011 have constrained debt provision worldwide. Financing conditions have become more difficult in most countries, as European banks experienced sharp increases in their cost of funding and investors remain in a risk-averse position....While sovereign interest rates are at historic lows, risk and liquidity premiums are at or near historic highs, which means that – together with a number of reforms after the financial crisis (Basel III, Solvency II) – long-tenor bank lending for all forms of infrastructure has dried up. It may be replaced by bond markets, sovereign wealth funds and institutional investors (insurance companies and pension funds), but that is not certain and will take time. The financial crisis also led to a strong increase in global commodity prices, including the price of raw materials for biofuels and biomass energy production". IRENA report 2012, P.17.

⁴ See „Development, equity and policy - economic and financial Crisis“ (Univ. Göttingen/ HS Merseburg, 29.6.-2.7.2011) <http://www.isces.net>.

⁵ Financial and Economic Analysis of infrastructure/public projects in enlarged European Union, e.g EU Structural Funds, European Investment Bank: Cost benefit analysis of public investments, http://www.worldbank.org/oed/education/documents/education_primary_rationale_paper.pdf

⁶ For Public Investment in Higher Education and Ushering Our Campuses Into 21st Century European University Association has called on the continent's governments to commit to major investment in higher education and research, and to renew efforts to reach the Barcelona target of 3% of GDP investment in research and the 2% investment in higher education proposed by the European Commission.

⁷ A. Sen (1999) argued that Europe, North America, Japan, and East Asia benefited from the public provision and finance of widespread primary education. Many economists appeal to the experience of European countries during their phases of rapid growth during the 19th century as evidence for the contribution of education to economic growth. But direct steering mechanisms, and regulations as well as unbalanced accountability procedures which the EUA believes will be counterproductive in making universities an essential player in overcoming the crisis. <http://www.universityworldnews.com/article.php?story=20100528184210310>. Finland, Sweden and Denmark have all started to introduce tuition fees at least for some offered programmes and/or will charge tuition to foreign students.

⁸ See contributions to social philosophy/ political economy James Buchanan- introduced ethics, legal political thinking, and social thinking into economics: Public choice analysis, etc..

⁹ • Market /Competitive Analysis: framework, market trends, market growth

• SWOT analysis: clarity specific strengths and weaknesses as well as market and environment side Opportunities and Risks of projects.

• Feasibility studies and Business Planning: Derivation realization of a suitable approach economic analysis. Investment viability in rated:

• Comparison and Review the realization concept -investment calculation methods

• Expense and revenue forecasts, Investment and human resources planning

• profitability calculation and sensitivity analysis

• Cost-benefit analysis: determination by (Detour) profitabilities of infrastructure projects or social returns (SROI), for publicly funded project.

¹⁰ Term grew in popularity, applied increasing generality to suggest the internal framework discernible in any technology: Also analyzing impacts of investment on capital requirements and determining budget and ideal financing:

• Cash flow forecast: liquidity and viability of the project

• Capital Needs Analysis: Determination the necessary capital investment

• Financial analysis: determination and assessment of funding options and optimal Financing mix (including PPP¹⁰ testing)

Regional Economic Analysis:

Consideration of public investment on commercial view beyond.

quantify and evaluate effects of investment project for Business location and underpin economic arguments:

• Identification of regional economic effective channels of investment

• Quantifying the effects regarding employment effects and regional value added,

Purchasing power and fiscal returns.

Analysis of contents and stakeholders, development of communication strategies to implementation of an active dialogue process. Political communication:

• Decision-Oriented Processing planning results

• Develop strategies and communication concepts

• formulation of targeted argumentations

• facilitation of planning and dialogue process.

Benefit-Co st Analysis: Its Relevance to Public Investment Decisions Discount Rates for Public Investment under Uncertainty.

¹¹ Human Development Index (HDI) is a comparative measure for countries worldwide. It is a standard measure the impact of economic policies on quality of life. HDI measures the average achievements in a country in three basic dimensions of human development: a long and healthy life, as measured by life expectancy at birth; knowledge, as measured by the adult literacy rate (with two-thirds weight) and the combined primary, secondary, and tertiary gross enrollment ratio (with one-third weight); and a decent standard of living, as measured by the log of gross domestic product (GDP) per capita at purchasing power parity (PPP) in USD.

¹² Gunnar Myrdal (6 December 1898 – 17 May 1987) pioneering work in the theory of money and economic fluctuations and for their penetrating analysis of the interdependence of economic, social and institutional phenomena."

¹³ China was able to exploit its potential as one of the world's major exporters and HDI has risen. The United Nations Conference on Trade and Development (UNCTAD, see web) was established for problems relating to the economic development. Can the Asian miracle be explained in terms of capital investments? *Public Investments in infrastructure*, see WEF's Global Competitiveness Report show contributions of education and railroads. Actual discussions also consider environmental aspects; also an end of the Asian Miracle, based on cheap labour: now workforce development is a global economic development approach. see Paul Krugman (1994): "The myth of Asia's miracle", *Foreign Affairs*. and World Bank(2006): "An East Asian Renaissance. Ideas for Economic Growth", IBRD .

¹⁴ Per capita Gross Domestic Product (GDP per head) is used by many developmental economists as an approximation of general national well-being. However, these measures are criticized as not measuring economic growth well enough, especially in countries where there is much economic activity that is not part of measured financial transactions (such as housekeeping and self-homebuilding), or where funding is not available for accurate measurements to be made publicly available for other economists to use in their studies (including private and institutional fraud, in some countries). recent theories of Human Development have begun to see beyond purely financial measures of development, for example with measures such as medical care available, education, equality, and political freedom.

¹⁵ Eckhard Freyer: Finanzkrise in Rußland, in: Evangelische Kommentare 11/1998, S. 653-655, Zur Wirtschafts- und Finanzkrise einer Großmacht, in: Das Parlament, Nr. 49, 27.11.1998, S. 16. European Financial Integration, Transformation in CEE and Accession of Cyprus, Nicosia 1998, p. 67 – 88. EU Economic and Political Cohesion after Enlargement, in: EU-Enlargement..., Nicosia 2004. p. 57-66.

¹⁶ Before founded 1949 GDR and construction of the Wall in 1961 3.3 million people, well-trained professionals, left. While the industry in the 1950s, yet innovations such as the "Trabant" and brought forth to the state invested in the 1960s in new facilities, the innovative power soon fell sharply due its economy no need to prove in competition. In addition, DDR researchers lacked contact with their Western counterparts. When the GDR in 1990 was again exposed to international competition, a misery technology standstill. Three decades industry had to be built from scratch, which is still not completed today. It lacks the big companies that produce in the West, most high-tech goods and promote their research to technical progress: 70 percent of the West German economic output per capita eastern states 20 years after the Wall fell.

¹⁷ Michael Jürgs: Die Treuhändler. Wie Helden und Halunken die DDR verkauften. München/Leipzig 1997, Siegfried Wenzel: Was war die DDR wert?, Berlin 2000; Mark Cassell, How Governments Privatize: the Politics of Divestment in the United States and Germany, Georgetown University Press, 2002. see Ruppeper, Hermann J /Sattler, Friederike /Wagner-Kyora, Georg: Die mitteldeutsche Chemieindustrie und ihre Arbeiter im 20. Jahrhundert, Halle 2006, for case studies on Chemieregion Halle, centers in Merseburg and Bitterfeld/Wolfen .

¹⁸ For Public Investments in Tertiary Education /performance in German government "initiative for excellence" see: Anger, Christina / Plüneck, Axel, 2010, Droht durch den künftigen Akademikermangel eine Abnahme der Konvergenzchancen Ostdeutschlands? in: IW-Trends, 37. Jg., Heft 2, Köln, S. 1–17, Statistisches Bundesamt (Hrsg.), 2011, Bildung und Kultur: Finanzen der Hochschulen – 2009, Fachserie 11, Reihe 4.5, Wiesbaden

¹⁹ The supply of university graduates significantly affects regional growth prospects in Germany. As the society ages the number of young, highly skilled graduates needed to replace older employees will significantly increase. A forecast shows that without inter-regional migration the number of university graduates will lag behind the demand of a growing economy. The bottleneck will be particularly tight in Eastern Germany. Between 2015 and 2019 eight out of ten and between 2020 and 2024 nine out of ten graduates in the region will be needed to replace highly skilled workers who reach retirement age. In West Germany two out of three graduates will be needed filling the vacancies. New highways, renovated façades and a falling unemployment rate - these are the successes of the "Aufbau Ost". However, the economic performance in East Germany can compete with the far western levels. 20 years after the fall of the Berlin wall East Germany has caught up with the west in some aspects while still lagging in others. Its GDP per capita remains stuck at two thirds of the West German level and its unemployment rate is twice the West German rate

²⁰ Government in Magdeburg accumulated primarily in the 1990s, high debt on the neck: In 2010, every inhabitant was statistically with more than 8,700 euros in debt - the average of all states per capita debt was however less than 7,300 euros.

²¹ Government Commission for monitoring energy revolution: reduce primary energy consumption by 2020 compared to 2008 as planned by 20 percent; calculation according to the efficiency in the coming years will be increased by 2.6 percent per year - so far there are only about 1.6 percent . Many researchers believe the most cost-effective option in developing renewable energies, wind energy on land - but this should be better coordinated with the network expansion. Climate change targets and sources of revenue to fund the energy revolution not to compromise, they remind us of a reform of the EU's emissions trading system by a sharp drop in prices for emission rights. <http://www.faz.net/aktuell/politik/energie/wende/>

²² German companies already control a third of the worldwide market for solar thermal energy. Wuppertal Institute for Climate, Environment and Energy calculated the projected revenues for German solar companies by the year 2050 under a best-case

scenario, it came up with €2 trillion. As alternative emissions-free but cheaper energy: In the next 20 years, photovoltaics will cost German electricity customers an estimated €100 billion as a result of the country's Renewable Energy Act of 2000, which guarantees fixed prices for renewable electricity fed into the grid – even though photovoltaics makes up only a little more than 1 percent of the German power supply.

²³ On 01/03/2013: Sunpower sold 579-MW project in California for 2.5 billion dollars to the power company MidAmerican Energy= Warren Buffett's Berkshire Hathaway. Buffett again investing where no one else wants in trends, before purchased First Solar.

China built up for years an enormous solar industry, but hardly promoted and installed equipment is probably the world's largest market in 2013 over Germany : 2015, China > an increase to 40 GW envisaged. In USA 6 GW new capacity 2013= + 50 % /2012.

Excess capacity in global solar industry based on huge government subsidies expanding Chinese solar industry could not keep up with demand. But price decline has triggered photovoltaics because of bankruptcies and factory shutdowns.

²⁴ The International Renewable Energy Agency (IRENA) is an intergovernmental organisation dedicated to renewable energy; objective is to "promote the widespread and increased adoption, and the sustainable use of all forms of renewable energy". This concerns all forms of energy produced from renewable sources in a sustainable manner and includes bioenergy, geothermal energy, hydropower, ocean, solar and wind energy. As of December 2012, the membership of IRENA comprised 159 States and the European Union (EU). <http://www.irena.org/adsw/index.aspx>

²⁵ Much of the literature on R&D is concerned with the question of whether public funding stimulates private R&D expenditure or whether it simply acts as a substitute for private financing. There are three mechanisms by which public funding can crowd out private investment. First, it is likely that the labour supply of scientists is quite inelastic, so that when the government provides a subsidy to R&D this may be spent on increased wages rather than new R&D, at least in the short run (Goolsbee, 1998). There may still be positive benefits from these subsidies from encouraging people to become scientists, or by increasing their effort at work by paying them higher salaries. Second, public funding could also simply replace private funding if business substituted public funding for their own funds. Third, public funding could distort resource allocation favouring areas with lower opportunities

²⁶ A range of economic studies over a long period have recorded a range of benefits to the economy as a whole and to firms individually. Several studies have found academic research to be increasingly important for industrial innovation, accounting for 15 per cent of new products, 11 per cent of new processes and up to five percent of industry sales (Mansfield, 1991; Mansfield, 1998; Beise and Stahl, 1999). These figures capture only technological innovations based on academic research that has been carried out in the preceding 15 years. Patent data also been used to identify the importance of public research for innovation (Narin et al., 1997). Evidence from Australia, for instance, found that 90 per cent of research papers cited in Australian-invented US patents were publicly funded. Studies of individual industries, in particular the pharmaceuticals industry, highlight the importance of public investment in science, with one study recording a 30 per cent return (Cockburn and Henderson, 2000; Toole, 2000). Gurdgiev (2006) uses data from the EU Commission report 'Innovation Strengths and Weaknesses' (2005) to plot public sector innovation drivers against economic growth for EU countries.

²⁷ E.g. Student exchange system for the Mediterranean neighbors based on the European Erasmus model.

E.g. effects of public investments into higher education in CEE/ Germany's Transformation and Unification process on development and growth.

²⁸ 1950 and 1967, California invested 22 percent of all state spending in public services and public infrastructure: once the model of public investment in its future, must admit that in its more recent history it has been the model of disinvestment ; democratic access to higher education promised in the United States by a series of legislative acts responding both to immediate economic needs and to far-sighted understanding of future priorities.

²⁹ Public support can encourage private sector investments by addressing market failures associated with incomplete information, inappropriability of the benefits of privately funded research or lack of suitable finance for innovation. An OECD study (Guellec and Van Pottelsberghe, 2004) attempted to quantify the aggregate net effect of government funding on BERD in 17 OECD countries over the previous two decades. The study found: • Direct government funding of R&D performed by firms (either grants or procurement) has a positive effect on BERD (one dollar given to firms results in 1.70 dollars of research on average); The relationship between R&D and innovation is not a linear one. The outputs from science and technology activities depend not only on the amount of R&D input, but also on efficiency of the entire innovation system (OECD, 1999a). In order to optimise the efficiency of this system it is vital that effective linkages are developed between its different components, which would facilitate the transfer of scientific knowledge. The Government has a key role to play in this area (OECD, 1999b). The most important support for Higher Education-industry collaboration under the NDP 2000-2006 was the RTDI for Collaboration Programme. The principal schemes supported under the programme were: Innovation Partnerships, which aimed to build R&D partnerships between industry and Third Level Institutions.

³⁰ See: Financial Mechanisms and Investment Frameworks for Renewables in Developing Countries, IRENA Dec. 2012. also <http://www.idced.com/>

³¹ Economic literature on extent of the returns from publicly funded research shows evidence that publicly funded research does make substantial positive contributions to productivity, human capital development and economic growth. The challenge is to organise the national research and innovation system in such a way as to maximise return on investment. The benefits that spill over from public and private research are becoming increasingly important, as knowledge, high-level skills and innovative capacity are key sources of competitive advantage. Evaluations of publicly funded research programmes concluded that progress has been impressive and funding must be continued in order to achieve sustained gains.

³² For this reason, the present master thesis considers the implementation of financial and controlling instruments from the representation of project progress of alternative power MÜKA GmbH for an example of a company in the field of renewable energy and its course more accurately explain project. what the different departments together and interdisciplinary project from all perspectives considered complete and correct. Finally can still make a judgment on biofuels. Therefore, this is a difficult work position. Base is that the alternative power MÜKA GmbH and Merseburg (FH) created a partnership. Landwirtschaftliche Biokraftstoffe e.V. www.lab-biokraftstoffe.de, European Ethanol Fuel Association www.ebio.org, Mobil ohne Fossil www.mobil-ohne-fossil.de, Fachagentur Nachwachsende Rohstoffe www.fnr.de sowie die Thesen zur Energiezukunft für Deutschland <http://www.energiezukunft-fuer-deutschland.info/index/confirm/key/be8b7dfe0108ce96d07f65becd98f74a>, *Bosch and VW developed the Total Flex engine: it can use any mixture of petrol and ethanol, 100 percent to 100 percent alcohol fuel.*

³³ A legendary conflict of fuel/energy versus food is avoided in MÜka- model: A conflict/ dilemma regarding the risk of diverting farmland or biofuel-crops detriment of the food supply on a global scale. Ethical aspects of global development involve the cultural and social issues relating to the environment becomes more relevant.

³⁴ <http://www.enertec-leipzig.de/> A range of biogas energy and 3% of the electricity consumed in Germany are produced. <http://www.dbu.de/> Verbio a leading manufacturers and suppliers of biofuels and also the only industrial-scale producer of biodiesel, bioethanol and biogas in Europe. Its nominal capacity is about 450,000 tons of biodiesel, 300,000 tons of bioethanol and 480 gigawatt hours of biomethane per year. The company continues to manufacture its highly efficient proprietary fuels, energy-saving production processes and innovative technologies. <http://www.green-ventures.com/>

³⁵ <http://www.bdew.de/> A boom in the creative industry represents a result of this trend (design etc.). In some industries we can observe that formal businesses are not always necessary to provide products and services. Even in more classical service sectors like health care the final consumer becomes an important partner in the service provision process. <http://www.bdi.de/>

³⁶ *An Energy Revolution in Africa The biogas backpack; Not only in rural areas, and in many African cities is today still cooked with wood or charcoal. Therefore, everything is kind of combustible, collected. Maps to see the radii that form around villages around, where there are already no wood and no more forest. But a very different energy source is much closer, namely in the stalls of cattle: the biogas.* <http://www.swr.de/swr2/wissen/biogas-in-afrika/-/id=661224/nid=661224/did=10850962/r37ewm/index.html>

³⁷ Creating education services in case studies we develop and present in a digital format online use of ecosystem as well as social system service as an element of the business model. As new Concepts of Small and Medium-sized Enterprise Promotion especially focusing on the development and the implementation of new concepts in SME promotion. provide an overview about the experiences of the last 20 years in SME promotion around the world. Furthermore we will discuss new trends in the field which are directly related with growing importance of the service sectors in our economy as well as the sustainability of enterprise promotion activities.

³⁸ See Freyer, Eckhard: Die Kapitalbeteiligungsgesellschaft als Instrument der Wirtschaftspolitik. Frankfurt/M. 1981, ISBN 3-87144-638-6, Islamic and Western Investment Companies - An Empirical Comparative Study. In: Economics, Vol. 37 (1988), p. 52- 89, Les sociétés de participation islamiques et occidentales. In: G. Beaugé: Les capitaux de l'islam, CNRS 1990, S. 201 - 220.

³⁹ Given the price of energy massively in renewable energy and new technologies are being invested: Perspectives and visions appear in the work. Generally it is very difficult to give predictions, because the companies involved many details to keep secret. It is a broad field for research, since all of the departments is addressed to combine technical, social and economic aspects.

⁴⁰ Globalization requires complex life-styles; flexible processes, self-responsibility, work-life balance, social networks and integration. What matters is what people can achieve with their goods, and not what the individual actually has. The "capability" (ability) core concept was in Sens work, it is supplemented by "functionings," the values of a people, such as food, income, self-esteem and the active involvement in the community. See Amartya Sen (1985): "Commodities and Capabilities" and www.undp.org/info21; www.globalknowledge.org; www.kcenter.com; www.iicd.org;