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“Vergleichende Soziographie ländlicher Initiativen zur Entwicklung regionaler Energieautarkie mit partizipativem Charakter mittels vor Ort erzeugter regenerativer Energien am Beispiel mehrerer Regionen¹ in Brandenburg“

Supervisors: Prof. Schluchter, Technische Universität Cottbus and Prof. Sackmann, Martin-Luther-Universität Halle-Wittenberg

contact: ConradKunze@gmx.de

or: www.sozum.tu-cottbus.de

93 Theses on Renewable Energy as a collective good in rural areas

Sketches of a theory, drawing on the findings of two years of field research in rural areas in Brandenburg, Germany

1. The steam machine and industrialisation moved mankind at the end of 18th century in the age of fossil energy. Energy supplies that were till then satisfied mainly from wood, windmills and watermills thus took a non-renewable turn, first to coal and later on to oil, gas and uranium.
The combination of modern capitalism, steam (coal/oil) powered mass production and imperialism became a powerful trias, that would mature in the most developed nation of its time, Britain, and quickly expanded its rule over Europe, its colonies and the Globe.²
2. As far as the transformation of societies was driven by the spread of modern capitalism during the last two centuries³, and powered and made possible by the abundance of fossil energy, it ought to be assumed, that the present societies are not only shaped by modern capitalism but to the same extent by the wide use and dependance on fossil energy.

Arguments for modernity's dependance on fossil sources are found in many sectors of society: transport of goods and people reached a speed, not seen before, being available not only to a selected class of nobles but to the wide majorities; the rate of production increased, driven by mass production and the steam machine/automatisation, enabling mass consume of industrial products; agriculture yields much more food per square meter due to industrial fertilizer, produced by a chemical industry that was and still is based on oil and coal; as a result populations increased worldwide. The dependency of these societies on fossil energy supply are in the centre of power and politics, in a national as much as in a international scale. The Putin administration seems not less influenced by Gazprom than the Bush administration was by Texaco, international politics (including war) about oil and gas fields, uranium mines⁴ and pipelines have become widely discussed as such. The last but not least example is the tight connection of the US Dollar, the global financial system and oil trade, being paid for till now exclusively in the currency of the last super-power.⁵

3. Fossil Energy Resources (oil, natural gas, coal, uranium) will be depleted during this century.⁶

1 Feldheim, Uebigau-Wahrenbrück, Schipkau, Lichterfeld-Schacksdorf, Altdöbern, Spreewald, Drehnow

2 The close connection of this modern Capitalism and its dependance on fossil energy resources was first mentioned on the last page of Max Webers “The protestant ethics and the spirit of capitalism”

3 Karl Marx' core assumption was that the way people organise to satisfy their physical needs - work- shapes society more than any other factor.

4 Uranium is not burnt but nevertheless a fossil and finite resource, according to many calculations it will be used up this century.

5 for the so called Petro-Dollar see: Eichengreen, Barry, Vom Goldstandard zum EURO: Die Geschichte des internationalen Währungssystems, 1996 Princeton

6 Meadows predicts in “the new limits of growth” that even coal will be used up this century, other sources, also critical ones like Greenpeace Reports predict coal resources to last longer. Reports by companies and associations that depend on fossil resources (OPEC, IAE, oil companies) are more optimistic but all agree, on the quick end of cheap fossil energy an most of them predict the end of oil, gas and uranium in this century.

4. Fossil Energy Resources have reached or already passed their historical peak of continued annual increase of supply. The first energy peak to be passed is that for natural oil. (If the oil-peak has been, is or will be passed depends mainly on statistical methods and the political motivation of the author)
 5. On the other hand demand keeps rising. Further increasing world population and industrialisation especially in Asia drives the world demand to new highs. (while the OECD is also facing increased energy demands, although it's population is barely increasing any more)
 6. Increased demand and limited or decreasing supply is driving the attractiveness and search of substitutes. (and measurements to reduce energy demands, e.g. for cars, but that line of argumentation is not the object of this argumentation, though also worth further research)
 7. So far, fossil sources seem to be substituted with solar resources.⁷
 8. Solar resources comprise obvious forms as photovoltaic panels, solar panels to heat water (or oil), but also wind turbines, since wind is generated by the sun's radiation producing heat when reaching the earth's surface. All kinds of bio-fuels are effectively also powered by the sun. Power generated by ocean wave and tidal driven devices is having its source in the moon's gravity and also sun radiation (that heats water layers in the southern hemisphere, that drive the gulf stream, to name only one example). The variety of examples demonstrates, that energy sources that are called "renewable" are synonymous with being "solar". The renewable character of these power sources might always be traced back to the energy input of sun radiation into the earth's atmosphere, that is in human time horizons infinitely renewable and may be labelled *sustainable* according to the UN-Rio definition.
 9. Human energy demands have been met with solar sources for most of the cultural development since fire was used to generate heat and light. The upcoming of non-renewable
 10. sources seems, as its end is approaching, been an interplay. If agriculture is counted as a source for human energy demands, economy has always depended on "solar" power inputs with fossil fuel as an extra.
 11. Summing up the 9 thesis, the 21st century will be one in which the fossil economy is substituted by a solar powered economy.
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11. Following the assumption of thesis 1 and 2, a change of the *means of production*, as which the fundamental replacement of fossil by solar sources has to be interpreted, should trigger a change of the *mode of production*. In this line of argumentation, the *mode of production* is the structure of the market society, usually generalised as *modern capitalism* as we know it since industrialisation.
 12. The question to be sought by Social Scientist is thus not if, but *how* the post-fossil capitalism will look like, how the transformation might be shaped and when it will reach a critical stage.
 13. Considering, that nations like Germany, Spain or Denmark already now produce two digit percentages of their electricity demand from renewables, the question *when* the transformation will start can make way for researching the empirical indicators of the described consequences of solar-energy production.
 14. Conventional fossil energy production needs little horizontal space, but penetrates the vertical level. Drillings for conventional oil and gas comprise relatively small pieces of land, compared to resource extractions of similar importance. Solar energy production penetrates larger areas of land, even it's most space-effective form, wind turbines, need more space than a drilling for an oil field, that yields an equivalent to the wind turbines energy production during decades.

⁷ and geothermal energy, that is finite, but on such a scale that it is usually counted as "renewable". It is the only "renewable" that is not solar.

15. Since the primary source is daylight, the distribution over the earth is much more broad than that of fossil sources. There is hardly a place or a nation that is lacking sunlight⁸, while there are only a few places and a few nations that are blessed (or cursed) with rich oil, gas or coal fields.
16. The wide availability of the raw material sunlight, is much less likely to produce the energy monopolies, that have sprung of fossil energy sources.
17. Solar energy cannot be monopolised as much as fossil energy.
There are attempts of course: the huge wind-fields in the Northern Sea and Mongolian Dessert, the DESERTEC (Sahara) Project and the tendency to buy up land for biomass production in the southern Hemisphere⁹. But if such a monopoly tries to raise prices or put political pressure above a certain level, there always remains the *possibility* of substituting the energy production at another location, challenging the to-be monopoly. A possibility not at hand with fossils.
18. Since solar sources lack the natural tendency of fossils to foster monopolies, a post-fossil energy production will be much less monopolistic. Optimists like Hermann Scheer expect even a monopoly free world of energy production, and interpret the present opposition to renewables (in Germany) as the beginning end of a doomed fossil industry.
19. One needles eye of energy industry remains: the grids.
20. Renewables have less economic scale effects (and limitations) than fossils.
A solar panel of 1x1m produces roughly the same amount of energy, no matter if it is installed on a family house roof or in a large scale facility of the same hemisphere. Since it is clean, silent and need little or no care, the efficiency increase from small to large scale production is small compared to burning fossils. Small scale wind turbines are being developed (in a quickly growing market). So besides an anti-monopoly feature, renewables have a tendency to small scale production, at least in comparison to fossils.
21. Small scale production and unlimited resource access are a strong driver for decentralisation.
22. The possibility of decentralised of-grid production and small local grids goes hand in hand with a need for long distance energy transportation.
23. Independence from national grids will increase as storage technologies like pressurised air or hydrogen production are introduced.
24. Summing up the foregoing arguments: solar energy production is structurally anti-monopolistic and rather fostering de-central small scale structures.
25. The energy net thus becomes the primary tool to further monopolise and control the market. But even if so, the monopoly effect is weaker that of the oil/gas/uranium/coal production.
26. The most intense political struggle for control will shift on the long term from controlling extraction to controlling distribution, to the grids.
28. The shift from vertical to horizontal energy production means a higher demand for land.
(It has to be mentioned, that the late fossil energy extraction in its different non-conventional forms like tar sands, non-conventional gas etc. is not only using but ecologically devastating large areas of land.)
29. As seen during the last years, a concurrence to food production, rainforests and cultural heritage sites¹⁰ is the consequence. If this is avoidable is a political question. Following the structuralist view, it will keep being a line of conflict that will even increase in intensity.
30. A new race for land has already begun and the power structure in that field might change as well. As a consequence there might be a complete different political and social approach to land as an asset and food production as a human right. Though this is an important question, it is dropped here in favour of another one.

8 The critical reader knows about the days without sun in the northern winter and of course this has to be counted as an exception.

9 There are even signs, the same is happening in eastern Germany.

10 due to dams like the planed Ilisu dam in south eastern Turkey

31. The rising value of land favours those that own and use the land.
32. At least in western Europe land ownership is *still* distributed heteronomous and close to the actual farmers that seed and harvest.¹¹ Thus land is not highly monopolised, it is often not even alienated from its users, the farmers (maybe one of the last industries with that feature).
33. As energy production connects with land ownership, two tendencies appear: either the land ownership becomes as monopolised and alienated as the energy production (still) is, or the energy production becomes as local and non-monopolistic as land ownership.
34. Both tendencies might mingle, they might also be distributed unevenly across regions.
35. Rural Regions might profit from solar transformation¹², if the structure of land ownership bears the pressure it is exposed to when producing energy instead of (exclusively) food and shapes energy production rather than being shaped.
36. That the later happens is obvious as a lot of wind-parks have sprung up in eastern-Germany's countryside, nearly all of them financed by banks and capital from the financial centres.
37. Since the capital and control of these wind-parks derives as good as never from the big German energy monopolies (Vattenfall, RWE, EON, EnBw), there is still a decentralisation, though still not one that favours the local population¹³.
38. In many such cases, even taxes are to the greatest part not paid locally.¹⁴ So the only positive effect for local economies are the landowners' higher revenues for the 20 year land lease contracts.¹⁵
The same is true for other technologies like biomass or photovoltaic, renting away land for long durations is a praxis widely in use.
39. The overall economic effect in a region might even be negative, if agricultural production suffers more than landowners gain.
40. In conclusion, as is already empirically demonstrated, **renewable energy production does not necessarily contribute to a favourable regional economic development.**
41. A rough concept of that seems to be perceived by popular opinion which often rejects especially wind turbines in many places quite fiercely, even initiatives opposing solar-parks are reported¹⁶.
42. As argued in thesis 35 a de-central and local structure of renewable energy production is the second possibility of development. There are also some examples to be found, like the village Jühnde in north-west Germany, Güssing in eastern Austria and Feldheim in Brandenburg are examples of regions where renewable energy took a de-central and local shape.
43. In these villages, the financing is at least partially in the hand of locals, so the revenue also stays there, besides the taxes.
44. Land ownership plays an important role in keeping projects local, so land demanding energy production adopted rather to ownership structures than *vice versa*.
This is especially important for biomass-based energy production in Jühnde and Güssing.
45. Farmers who supply local biomass plants are closely connected to energy production. Since they deliver the raw material and consume energy at the same time, material and financial

11 A study of temporary shifts of these relationships promises some insights.

12 Cities might also face structural changes worth examining, but the study is limiting itself to rural phenomenons.

13 Another interesting research topic is what structural changes are caused in the financing sector comprising renewable facilities in Germany, that cannot be covered in this study.

14 A new law changing that, binding energy producers to pay taxes in the community where facilities are located, not where the company has its seat, was introduced in spring 2009. Its effectiveness will be seen soon.

15 building permissions for wind turbines expire in Germany after 20 years

16 Der Spiegel 2/2010

flows rather stay in the region than being concentrated in the economic centres.

46. **These villages have constructed local grids**, to distribute and sell the produced energy in the region; in Güssing and Jühnde heat, in Feldheim electricity and heat.
47. Güssing has calculated, that the whole village used to spent several dozen millions annually to import energy (gasoline, gas, electricity). By mainly satisfying its demands from local production, and beyond that, selling energy by feed-in-tariffs in the national grid, this permanent flow-out of capital turned into a net flow-in of capital, since at an annual scale, net-energy was not bought, but sold.
48. Turning thus from a region that *only* consumes energy into one that produces enough and beyond its consume, great amounts of capital stayed local. This surplus capital materialises in taxes paid, in the production facilities and its workers, the farmers and as return investments of the financiers of the grid and the production facilities.
49. Güssing enjoyed an economic bloom since it started investing in renewables. One explanation for that is the re-localised chain of supply and demand, bridged by local financing, production and transport (via the grid).
50. Even if individual consumers safe little costs compared to conventional imported energy, the effect for the region pays off collectively, supporting the whole economy.
51. Thus, it can be argued, that renewable energy production, if it is rather de-centralistic and local in terms of supply, demand, transport and financing, **has a positive effect on a local economy by keeping the surplus value in the hands of local producers and land owners, instead of contributing to the usual collection of surplus values in the capitalist centres**, like Moscow, London or Qatar to name a few.
Consumer prices for electricity and heat are lower than usual, so there are individual gains and incentives as well as the described collective effects.
52. For locals that means an emancipation from their usual alienation. The means of production are theirs. They control the mode of production. They collect the surplus.
53. In local niches this solar-energy production *might change* the mechanisms of capital accumulation.
54. So the question to be asked is, why some regions do develop an autonomous and renewable energy system like Güssing in a rather self-organised fashion, while others don't.
 There are several ways of failing in such an attempt:
 - a) Not to try at all, like still most regions.
 - b) Accept or even support the regions marginalisation and alienation to exploitation of land for renewables, e.g. villages with wind parks they don't benefit from at all.
 - c) Regions try to be self-organised but fail during the process.
 (like Havelberg in northern Saxony Anhalt)¹⁷.
55. Regions failing after trying have three options to choose from (as far as has been demonstrated till now in empirical examples).
 - a) They may either drop the whole project¹⁸
 - b) Keep a low profile process of not-succeeding-but-still-not-failing with little effort invested hoping for better times and chances
 - c) Give up the whole idea of self-organised, local not-marginalised development and outsource the whole project to (usually) *one* supra-local investor that is big enough to realise the technical infrastructure.
56. There are several ways of succeeding as well.
 - a) Initiate a conscious long term political process, that sets up the explicit target of

17 Havelberg planed in 2008/9 to set up a local supply and production of biomass energy production, but failed in the process of organisation and outsourced the whole project to non local investor, who is going to sell the produced energy to the city.

18 e.g. bio-mass energy production in Erbsen-Lödingsen close by to Jühnde, 4/2009

developing a certain energy project with de-central features. Typically this starts with a declaration to become an energy-autonomous region/village/city voted for by the regional parliament. (e.g. “Potsdam Mittelmark” and many others)

b) Not initiate a conscious long term process but realise step after step structural parts of self organised energy facilities (that economically sustain themselves) that unintentionally sum up to an integrated local energy production/consumption system. This may start with a rather economic initiative (being increasingly supported by politics), as in Feldheim¹⁹.

c) Single facilities are realised in the step by step fashion (see above) being initiated rather by politics than economic actors, motivated in example by rising energy bills for public buildings and fostered by government programs and subsidies²⁰.

57. The next question to be dwelled on is what causes regions to initiate such processes:

a) It takes usually *one* person to take the initiative and start a project at all, at least in Brandenburg.²¹ This is a prominent person, being either one of the few economic actors, or the major or the superior of the municipal administration “Amtsverwaltung”. This person is either holding several central positions and/or is embedded in social networks that combine the sectors: politics, economy and administration²² (and sometimes social associations and clubs “Vereine”)

b) The initiative may be endogenous, from a non local economic actor (Feldheim).

c) It may derive from an endogenous administrative actor (governmental program that supports weak regions) that may be *one* person in a suitable institution.

58. Having sketched, that the first initiative has a very individual aspect²³, observed motives of these people may be:

a) Setting up a (rather new) business in search for profit and running an enterprise.

b) Decrease the energy costs of public buildings to be a good major/head of administration.

c) Copy the development of successful projects (Güssing, also Feldheim).

d) Connected to b and c, realise an (at least partially) autonomous energy supply/consume in order to realise b and/or the positive economic effects seen in Güssing.

e) As a *causa prima* for an effort pursuing economic improvement people often point to the need to slow down, stop or reverse the demographic crisis of the region²⁴.

f) Do what everyone does, following the fashion, especially to gain a “green” image for the region or one particular project. These particular projects have so far been connected to tourism and the expectation that a “green” project will increase tourism or even become an attraction itself (as in Güssing).

19 In Feldheim the first wind turbines were set up in 1995, in 2009 a local heat net and biomass facility started to supply the *whole* village with heat energy. For 2010 an electricity net is scheduled to start supplying the *whole* village with electricity from biomass, photovoltaic and the wind park. Except the wind park all facilities are owned by the villagers themselves.

20 Besides the EEG, there are to be named the “Konjunkturpaket I and II” the “Klimaschutzprogramm” and other financial aid packets.

21 That the beginning is rather a one-man-show is probably not uniquely caused by renewables but by the social structure of east Germany’s countryside being depleted of young and skilled people, that mostly migrate to the big cities in search of wage labour. The social structure thus lacks people that have the abilities and motives to start something new.

22 In most villages politics (Gemeindevverwaltung, Ortsvorsteher) and administration (Amtsverwaltung) are not united in one institution but independent of one another, often enough with conflicting interests.

23 That the rural agriculture in the German territories east of the river Elbe is characterised by strong centralisation and elite structures rather than markets with equal participants or even democracy was described by Max Weber in several writings in 19th century, e.g. Weber, Max. Die protestantische Ethik und der Geist des Kapitalismus.

24 Nearly all rural regions in eastern Germany face a severe demographic downturn with its most odd effects still to come.

- g) Idealism, connected to perceived climate change and environmental consciousness²⁵.
- h) Idealism, connected to a rejection of energy production based on coal due to negative personal experiences with open pit mining for coal²⁶ in Brandenburg²⁷.

59. One actor alone is usually not enough, even if it is an influential one. **The success of local self-organised energy projects depends often on the cooperation of several groups:**

- a) politics (city council “Stadtrat”, village parliament “Gemeindeverwaltung”, not-professional major “Ortsvorsteher”, professional major “Bürgermeister”)
- b) administration of a district (Amtsverwaltung)
- c) economic actors (especially agriculture: “Agrargenossenschaft”)
- d) associations and clubs of Sport, Culture etc (Fußballverein, Heimatverein etc.)

60. Since politics and administration are usually separate legal bodies in the brandenburg countryside, their relationship to one another is crucial for any local initiative.

If both have a relationship of mistrust and block one another, regional projects are unlikely. Projects are successful if administration and politics are either not separated (as it is the case in cities or areas with that status), or if they have a good relationship to one another, or if a project is far enough in the domain of one of them, so the other one is left out (e.g. some villages enjoyed such an autonomous status that they could permit a whole windpark themselves without asking the administration for permission)²⁸

61. Associations and Clubs have an indirect influence due to their importance for the local opinion. Their heads and spokespersons are de facto local opinion leaders. Since these associations are the forum where people come together to exchange news, gossip and chat, they are often the place where the *public opinion* is formed.

62. Several positions of 59. are often united in one person, it is no exception that the major is also the head of a club or has a company etc.. Only politics and administration may not be combined legally.

63. Networks of these people play a crucial role. Usually the local stake holders are connected on an informal level that is characterised usually by a mixture of shared personal interests in political and economic goals. Their trust and good will to one another is as important as any formal or legal relationship²⁹.

64. All actors do usually care for good relations to one another, based on robust self-interests, as it is typical for integrated elites. There are only two exceptions: the axis politics-administration and the relationship of major and municipal parliament. Informal elite networks are thus especially important to bridge the gap between those two.

65. Public opinion matters only in cases involving a municipal parliament the power to block proposals. Often enough though, the local parliament is small in size and dominated

25 That was and is still done in South-Eastern Brandenburg, especially personal experiences with forced relocations and destruction of whole villages.

26 Clearly observed only once, in one case at least mentioned as one of several motives.

27 That was and is still done in South-Eastern Brandenburg causing personal experiences with forced relocations and the destruction of whole villages and landscapes. People face this as a loss of personal and group identity, as their villages are destructed. Moving people out of their villages is sometimes quite an aggressive process, causing families to break up, splitting communities into foes.

28 though these villages are exceptions now, most lost their political autonomy. They also lost the right to permit land to be used for windparks, that permission is now granted by one central administration for all of Brandenburg, that is very restrictive on windparks, following the traditionally rather coal friendly politics of Brandenburg's politics.

29 An observation made in all seven regions that were researched.

by the opinion leaders that are holding elite positions in the other three sectors, so it does not reflect *public opinion* but elite consensus.

66. Projects regarding local energy production vary greatly in the necessary effort to be made. Small scale projects are quite independent from public opinion and parliaments, the larger and more complex projects are, the more weight gets public opinion and also the associations and the parliament.³⁰ Typical project forms are:

a) supplying a school, a kindergarten, a public building etc. with power from solar panels on its roof or with heat from solar collectors or with heat and electricity from a block-heating-compound (Blockheizkraftwerk (bhkw))

The return investment is secured by the law “Erneuerbare Energien Einspeisegesetz (EEG)”, also legal frames and financing by banks or private investors is strongly institutionalised. Formal procedures and financial mechanisms are known at least among experts and most economic elites. Since some families invested on a private scale in solar panels on their houses roof, knowledge of the concept and a positive relationship towards it is also partially existing in the “lay population”.

b) supplying such a building with electricity from a mini wind turbine

Wind turbines are rotating and seen by neighbours, in contrast to solar panels or bhkw. So their agreement may play a role, especially since wind power is unpopular in many regions.

c) Constructing new buildings and infrastructure that is equipped with renewables, e.g. housing for tourism, connected to the electricity grid.

Independent from energy production facilities (usually solar panels) the legal and economic requirements for new buildings are high hurdles than just upgrading an existing building.

d) Setting up a biomass or biogas plant to produce electricity and heat without a new grid, selling mostly electricity to the supra-regional net.

Once public opinion gets aware that biomass and biogas plants may emit some odour, resistance at least of those living close by is possible. Biomass has the negative image of burning food (biogas does not, it uses animals excrements) and may be rejected for that reason by local farmers and/or the population; both was clearly observed in one village.

e) Constructing new buildings without a connection to the electricity grid, that satisfy their whole demand of heat or electricity or both from local renewables, possibly in combination with a mini-grid between several buildings.

The off-grid solution is the only one where technical problems may dominate over political ones. Though the off-grid solution is still very novel, it seems that the company in control of the supra-regional grid, Vattenfall, is very aware of such first steps that might sum up to a serious threat of its monopoly, so it might try to mobilize its influence on local politics to boycott such attempts before they become established.

f) Setting up large wind turbines close by (close enough to receive the taxes)

Financially a promising project, taxes stay partially local, land owners have a chance of gaining high revenues to lend their land away for the turbines but more than that for the dirt-roads to transport the building parts to the construction sites. Popular opposition is very likely, since some people do not profit from land-lease and fear acoustic and optical harassment. Local participation in a turbine (one roughly costs 2 million €) happens, but very seldom. Since laws were changed, this is not an option any more in Brandenburg for regions, that lack political competences to regulate wind park sites.

g) Supplying a street or a part of a village with heat from biomass/biogas facilities through a newly build grid (heat grids are very rare in the countryside).

Only from this point on does popular support play a major role. To be economically feasible, such a grid must supply most if not all houses of a street, so wide support is necessary. **Since that is very unusual for local politics, elite actors are often a little helpless, lacking experience, knowledge and pre-concepts how to deal with that situation. What is also missing are social institutions to link lay people to technical experts and elites** (dates and places to meet, how to behave in meetings,

³⁰ If shared opinions are formed in the associations, as argued before, it is unlikely that the parliament will vote much different than what is expressed by the associations and their heads. So the parliament is rather an expression of the public opinion, the “real” political body in a functional sense are the associations.

how to talk, how to link the meeting to village life, how to embed it into village gossip and general discourse)

h) Supplying a whole village with heat from biomass/biogas facilities.

The more people involved the more complex becomes a broad consensus.

i) Supplying a street or part of a village with electricity via a newly build grid.

So far no case is known of a village that got permission and cooperation of the supra-regional grid-owner Vattenfall to use its grid. That may happen in the future, as more and more cities realise the possibilities of re-establishing public control of the electricity grid, but contracts are usually running for long periods and prices to be paid for grids are high, so this has not been achieved yet (certainly not in Brandenburg). The only solution is to build, parallel to the old grid, a new one. Like the heat grid, this one also needs high participation of locals to be economically feasible. Besides that, it takes a higher effort to generate great amounts of electricity than heat. Possible is a combination of many sources in combination with one strong source: a wind park or a solar park, both are more expensive than a biomass/gas facility. A wind park requires the most legal permissions that are not (any more) in the hand of local politics.

k) Supplying a whole village with electricity via a newly build grid.

l) Supplying a whole village with heat *and* electricity via two newly build grids.

This may sound unlikely but happens indeed in the village Feldheim. Experts have argued that once the requirements of the heat grid were met, it was a relatively small extra effort to lay electricity cables in the trenches that are dug anyway. This is possible because a huge windpark close by generates enough electricity that cannot always be fed in the regular grid and is owned by the same company in charge of the heat grid, so the electricity source was already there, waiting only for a consumer. Since most windparks “waste” energy when regular grids have no capacity, that seems to be a solution suitable for many regions.

67. **The eleven energy facilities can be categorised in two groups**, those that work without a new grid (a - g) and those that require a new grid (g - l). In each group there are gradual differences in the time and effort needed; the qualitative difference dividing both groups is the need for wide public participation and consensus necessary for all grid projects.
68. Grid projects require a very positive public opinion and thus depend much more on actors like associations, opinion leaders and parliaments than non-grid projects.
69. A broader acceptance is necessary since most people in a street, a quarter or a whole village have to agree to the grid construction project. Agreeing means in this case personal action and involvement.
cables or pipes must be connected to houses, construction measurements must be agreed on. In case of a heat grid, the houses gas or oil heating is usually given off, or at least not sustained and certified (TÜF) any more, giving up personal energy independence. Participants are often expected to pay for the initial cost of setting up the system.
70. Broad acceptance is tuned favourable if people feel adequately informed about the project and perceive themselves (at least to some degree) in control, being capable of introducing their opinion to (some details) of the project.
71. For that to arrive, lay people, technical experts, economic experts, opinion leaders and political elites **must be able to communicate** with one another.
72. As partial results are achieved a *discursive practice* is established between these groups, especially between lay people and opinion leaders on the one side, and experts and elites on the other side.
73. Such a *discursive practice* comprises ways to talk with the other group and to talk inside one’s own group about the project. It enables people and groups to find a common ground of communication, to avoid conflicts and solve problems (technical as much as social).

74. The *discourse* uses technical details and termini to make them part of the *discursive practice*, being used as tools to solve conflicts, they are symbolically interpreted as connected to persons, stories and emotions of a village.
75. The *discourse* of an energy project is structured in opposing patterns: pride/shame, tradition/modernisation, own village/neighbour village, trust/mistrust.
76. Where this *discourse* is missing, participants may be talking with one another though without the necessary understanding what the other group means - communication fails. **A shared *discourse* on the energy topic is necessary for success.**
77. A lack of understanding of one another does not permit the development of a necessary level of *trust*. (as much as a lack of trust hinders communication)
78. Without trust and understanding, lay people do not participate in projects. As far as participation (grid) is necessary, such projects fail or must be reduced and adapted in their aspirations.
- 79. Trust and mutual understanding are necessary for success** and depend on a shared discourse.
80. Opinion leaders usually hold a second key position, often in the local economy. Their support is crucial. If all opinion leaders support a project, the resulting *peer pressure* highly increases chances of a consensus. They are the ones to mediate between lay people and experts/elites.
Without their support, no participation of locals may be achieved.
80. The former thesis can be subsumed under the term of *social capital*. A certain level of *social capital*, as the ability of a community to collective action, is necessary for participation.
81. If projects of collective participation are realised successful, *social capital* increases. The chances for further projects are better, especially for a next step out of several.
82. If hurdles for local participation or popular support are too high, elites are dropping the attempt by redrawing on the top-down mechanisms, that are usually used, ending the participative ambitions.
83. Behind every initiative (in Brandenburg) stands *one* strong woman, *one* strong man or *one* strong family which are able to organise informal arrangements.
84. As the development path of local, renewable energy autarky is becoming more frequent, it is shaped as a standardises social institution.
85. The more formalised the model becomes, the less social capital is necessary for its application.
86. The diffusion of energy-autonomous regions spreads from regions with high levels or social capital towards those with low levels of social capital.

The preceding theses can be summed up in the following assumptions

87. Renewable Energy production *may* result in economic decentralisation.

The countryside *may* significantly profit from such a paradigm shift. The structural constraints are the distribution of land and of houses. The social constraint is the local ability for cooperation.

88. Renewable Energy production *may* result in political decentralisation.

This is caused partially by federal laws and regulations and partially by the local abilities to use the chances of renewable energy production.

89. Renewable Energy production *may* result in a decentralisation of the energy sector.

This is caused by political and economic trends. In contrast to the fossil energy regime, a solar production structure is opening up the possibility for de-central production. However this is a possibility and not a *sufficient condition*.

90. A central resource is land ownership.

Either the energy structures become as diverse and rather democratically distributed as land ownership³¹ or land ownership becomes as monopolised as the present fossil energy regime. Both tendencies are antagonistic.

91. A de-central turn would imply a re-embedding of energy production, as a vital part of economy, in society. The trend of de-embedding of economy that last until now, (Felix Guattari) would be broken.

92. Such a political subject, emancipated from the chains of an authoritarian economy, would have the freedom to make *political* decisions (Hannah Arendt). It might decide to substitute permanent economic growth for a *de-growth society*.

93. This solar and de-central Transformation does not wait for IPCC, UNO or Copenhagen accords, (Hermann Scheer) it did already become reality in geographical and local niches. Its diffusion starts from villages, small cities and rural areas. Majors and politically engaged people are its proponents and local populations its beneficiaries.

31 At least in middle Europe land is rather distributed in small plots and not highly monopolised as in the global south.