

Answer 3 out of 4 questions

1. Innovations sometimes give negative effects for human health and the environment. Give two-three examples. Why do innovations sometimes result in such problems?

The key to answer this question is good knowledge of the editorial by Coad et al (2020) on the dark side of innovation. The examples on negative effects of innovation includes increase in allergica and asthma, lung cancer, reduction in human sperm count, positive relation between new cancer cases and per capita income, global burdens of air pollution to are some negative effects.

The paper list a number of dimensions concerning why innovations sometimes result in suck problems:

- Scale, explorations by lead users vs. the dependence of mass consumers
- End of product life considerations, which are known from the start – but often ignored until the end of the product.
- Features vs. bugs – “unintended” vs. “unanticipated consequences
- Innovation to deceive or escape regulation
- North-South dimensions – when rich countries discover innovations are harmful they collect the waste and ship it to poor countries

To know these dimensions and give some detail on each of them is necessary to get a good grade.

2. Discuss the role of socio-technical experimentation, also called transition experiments or sustainability experiments, for learning and innovation in energy transitions. Use examples from the field of off-grid and grid connected solar electricity.

The paper by Ulsrud et al (2011) on solar transitions and solar minigrids are important to answer this question properly

The article presents new empirical material from a case study on longstanding, pioneering efforts on implementation and use of solar mini-grid systems in the Sunderban Islands in India. These local, socio-technical experiments have been investigated by a trans-disciplinary team of researchers and practitioners in order to gain a deep understanding of the diversity of social and technical factors influencing the ways in which the systems work at different levels. This socio-technical research highlights the dynamics between technology and society and how they are mutually influencing and shaping each other. These dynamics create gradual changes in the socio-technical system of technical devises, people, practices, knowledge and other elements, requiring adjustments also by the implementing actors. A range of technical and non-technical factors at various levels are found to be relevant for the implementation, operation, sustenance and further development of the solar power

supply systems. The research points to important factors that should be taken into account and considered when planning similar activities.

3. Wind energy has been presented as an opportunity for rural areas, but at present there are conflicts over wind energy. Present and discuss positive and negative consequences of wind energy for rural areas.

To know the paper by Clausen and David (2020) titled “Renewable energy for sustainable rural development: Synergies and mismatches “, is necessary to answer this question in a satisfactory way. The Paper by Gard and Karnøe (2012) on the emergence of the Danish wind energy industry is also important.

There are some key “takeaways” from the paper by Clausen and David:

- There is growing interest in synergies of renewable energy and rural development.
- Synergies can be regarded as socio-ecological fixes of capitalist crisis tendencies.
- We discuss mismatches and potentials by drawing on Denmark and Scotland.
- Growing capitalization tends to ‘dis-embed’ renewable energy from local economy.
- Economic potentials cannot be taken for granted but need to be supported.

4. How can niches become part of regimes according the Multi-Level-Perspective? Use examples.

Some key point concerning how niches can become part of regimes in the MLP;

Alignments between levels

- Transitions come about through alignments between processes at three levels:
 - *Niche*-innovations build up internal momentum through learning, price/performance improvements and support from powerful groups
 - Change at the *landscape* level creates pressure on the system
 - Destabilisation of the *systems* creates windows of opportunity for niche innovations

 - Alignments sometimes (!!!) results in the breakthrough of novelties in mainstream markets – where they compete with the existing system

To be get a good grade (B), some of the points below should be described:

Transformation pathways

- Different ways that niches can «conquer» an existing system
 - Reproduction
 - Transformation
 - Reconfiguration
 - Technological substitution
 - De-alignment and re-alignment
 - Sequence of transition pathways