



# Social science perspectives on the commercialization of green technologies

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# Entrepreneurial optimism

- Most entrepreneurs believe that their innovation (potentially) is better than existing solution.
- At the same time we know that few entrepreneurs actually succeed.
- Roughly 3/10 start-ups is still in the business after 5 years.





# Technological success or commercial success?

- What creates this gap between entrepreneurial optimism and the chances of actually succeeding.
- In other words: superior technologies often fails to move from laboratory to commercial success.
- Entrepreneurs tend to focus too much on their technology rather than their technology as part of a wider system.





# Socio-technical regime (i.e. technology ecosystem)

- Technologies does not exist in «isolation», they develop strong relationships to social, technical and institutional factors.



- Lock societies to certain technological solutions





# Transportation sector: mechanisms for technological lock-in

- Infrastructure/city design
  - has co-evolved with diffusion of cars, which in many cases creates a **car-dependency** to get to work, shopping, other daily tasks etc.
- Industry and investors
  - Develop certain knowledge, assumptions, believes which makes it very difficult to change their mindsets → **resistance to change**, difficult to introduce new radical technological concepts
- Consumer behavior (habits/routines etc.)
  - Your **weekly routine** of buying coffee and newspaper at the petrol station when refueling





# Redefine competition

- Your technology compete against existing technologies, but you also compete against technological ecosystems (regimes) that has co-evolved as existing technological solutions mature.
- *«As an entrepreneur it is no longer enough to manage your innovation. Now you must manage your innovation ecosystem» (Ron Adner, 2012).*



# Electric v conventional (simplified version)



- Some overlap with current regime
- Norwegian regime: incentives to buy electric vehicles is both a condition (the policy/incentives itself) and a change mechanism in the regime (contributes to change other factors in the regime, such as fuel infrastructure and user behavior).
- As a result: reversing the EV-policy will not necessarily ruin the market

	Conventional	Electric
Road infrastructure/buildt environment	—————	—————
Fuel infrastructure	—————	XXXX
Industry knowledge and mindsets	—————	XXXX
User behaviour	—————	XXXX

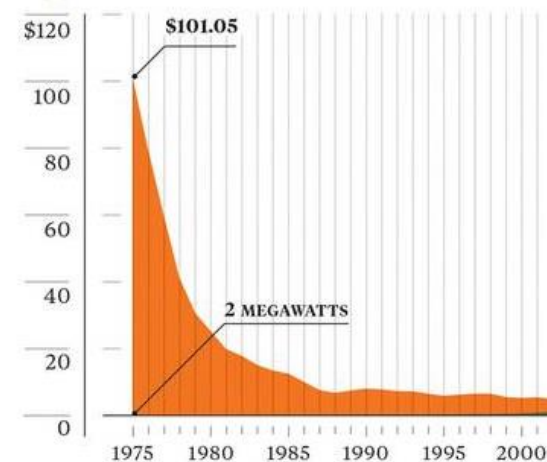




# Learning curve is important, but not necessarily sufficient

- **Mainstream economics (rational choice perspective):** if you manage to get the prices right (i.e. cost per MWh) , new technologies/technical improvements will diffuse
- **Radical innovations:** new technology (prototype) with huge social and economic potential
- **Incremental innovations:** gradual improvements to realize commercial potential
- Mature energy technologies have undergone incremental improvements for decades.
- Cost per MWh is obviously important, but not necessarily equal to success as other factors in the socio-technical regime influence on commercial success.

Price of a solar panel per watt







# The socio-technical regime for Norwegian energy sector

- **Domestic market:** cheap and affluent electricity based on hydropower
  - → highly competitive
  - → influence on subsidy regime/innovation policy
- **Complementary technologies:** e.g. energy storage
- **Infrastructure:** grid technology (and grid control)
- **Electricity system:** centralized vs decentralized
- **Industry/investor mindsets:** conservative or open-minded, protecting their own financial interests?
- **Policies and regulations:** uneven terms? Reverse green policies?
  
- Is your technology in accordance with the wider ecosystem?



# Shape your innovation ecosystem

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- Possible to some extent.
- May increase the chances of market acceptance and use.
- More and more common to «shape your surroundings» in a way that favor your technology, such as advocating for certain regulations (i.e. institutional entrepreneurship) → create «windows of opportunity»





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# Example: Urban wind technologies

- Lobby for green procurement policies?
- Work closely with the construction industry and real estate companies?
- Increase awareness about subsidy arrangements (e.g. Enova)?





# Conclusion

- 1) You compete with other/existing technologies (get the prices right)
- 2) You also compete with mechanisms in the socio-technical regime (get your ecosystem right)





# Image/figure sources

- <http://economicsric.blogspot.no/2010/09/incentive-trade-off-and-opportunity.html>
- <http://blog.ucsus.org/peter-oconnor/what-is-the-learning-curve>
- <http://primowind.com/>





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