

MISSION (IM)POSSIBLE? MOBILIZING INNOVATION - AND POLICIES SUPPORTING IT - IN ENERGY (SUSTAINABILITY) TRANSITIONS

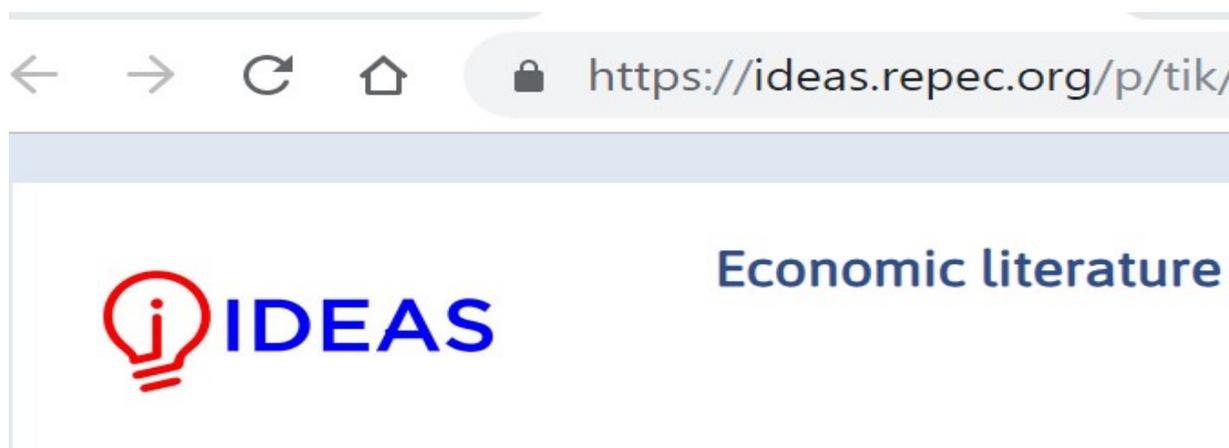
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Innovation policy is essential for the transition to sustainability

- Transforming society to sustainability requires **extensive change** (and **quickly**)
- For which **innovation** of all sorts – and therefore also **innovation policy** - will be essential.
- But innovation (& innovation policy) may fail for a multitude of reasons (lack of **knowledge, skills, finance, demand** etc.) – a **holistic** perspective required
- The usual **supply (R&D) orientation** of STI policy insufficient
- Learning from (successful) **policy practice: Wind** in Denmark, **Energiewende** in Germany & **Electrical cars** in Norway

More



Wind energy in Denmark: The evolution of a policy regime



- 1970s: **Oil-shocks**, a social organization of «tinkerers» develops (**wind-collectives**), the **Risø** test-center established (favoring «sturdy design»)
- **Entry of firms** from other industries (Vestas), **government** introduces **30 % subsidy** for investment in wind-turbines, domestic market sluggish
- Early 1980s : export boom (California, 65 % market share), Danish wind firms **global leaders**
- 1980s&1990s: Government supports **deployment, feed in tariff** replaces investment subsidy (1984), parliament **abandons** (plans for) **nuclear** (1985)
- 2000s: Support **politically contested**, no new installations 2004-8
- Support resumes towards end of decade (**COP 2009!**), **strong growth** in installations follows, **onshore & offshore**

Mobilizing green innovation: The German Energiewende

- 70s& 80s: Tinkerers, social organization develops, **grid access?**
- Resistance from **energy incumbents** (coal, nuclear)
- 1990: **First feed in tariff** (90 % of retail price for electricity) through parliament
- 2000: Red-green government: **radical overhaul & extension of support** scheme for renewables, fixed feed-in tariff (dependent of degree of maturity of technology) financed through electricity surcharge, **industrial development**
- 2000 & beyond: **Rapid growth in renewables**, Energiewende creates a **global market for solar** (Chinese entry & increased competition), rapidly **declining costs & prices**
- Recent years: Increasing **controversy**

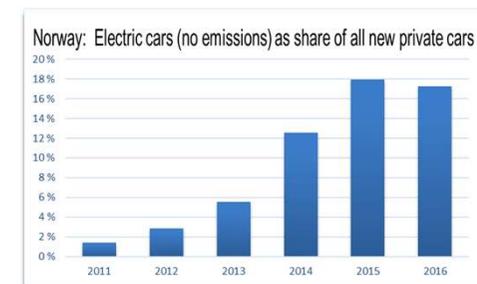


Speeding up the transition: Electrical cars in Norway

- 1989: First electrical car imported by NGO, import tax exempted
- 1990s: Norwegian **entrepreneurs** enter emerging industry («THINK»), social organization develops, some public support (R&D), but slow growth in domestic market
- 2000s: THINK acquired by Ford to meet Californian ZEV requirements, later abandoned, THINK bankrupt
- **New benefits for users**; tollroads (1997), value added tax (2001), use of bus-lanes (2003), **surge in demand** followed
- 2010+: **New and better (imported) models** becomes available (Mitsubishi I-MiEV): EVs from 1% to 17% of all new cars between 2011 & 2016, **far higher than in other countries**



1989: Pop-group AHA with first electric car in Norway



Summing up

- Classical “**mission-oriented**” policies, focusing solely on **R&D**, achieved **little** (70s&80s)
- **Demand-oriented policies & engaging with users & other stakeholders worked:**
 - Danish Wind: Supporting the developing of an **innovation system** (Risø) & **deployment**
 - Energiewende: Supporting **deployment**, learning, technology specific, **highly effective** (with important global repercussions)
 - Electrical cars in Norway: Supporting **deployment**, in combination with technological progress



Germany's failed GROWIAN project

Lessons for policy

- **Holistic innovation policy:** Address real barriers to change (including lacking **demand**)
- **Engaging with users** & other stakeholders; creating **alliances** of like-minded actors, at home and globally
- Providing **direction** to the collective innovation journey (no scarcity of resources but difficult to mobilize due to uncertainty about the direction)