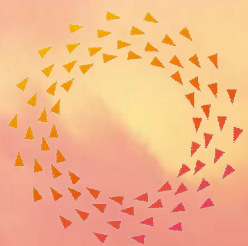


WHO ARE THE KEY ACTORS IN ENERGY TRANSFORMATION? SUMMARY OF THE PROJECT RESULTS

NEO-CARBON ENERGY 9th RESEARCHERS' SEMINAR

Mon-Wed 11.-13.12.2017

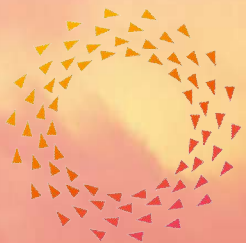
Lassi Similä & Tiina Koljonen, VTT



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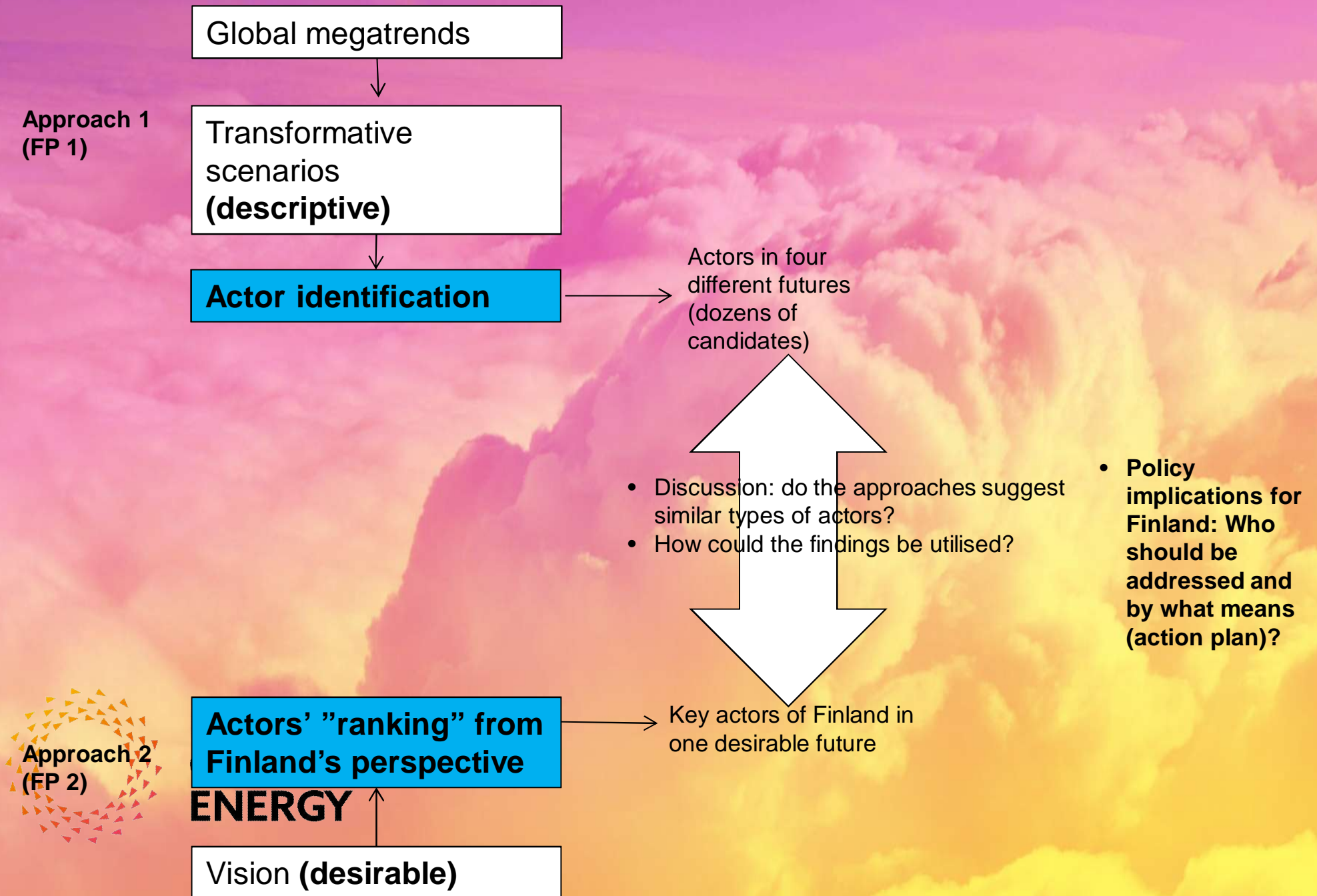
Actor analysis in NCE

- Focus on question of *who* instead of *what* in highly renewable-based Neo-Carbon Energy system
 - Techno-economic side ("what"?) studied very thoroughly in several other WPs of the project
- Benefits
 - Enriching and deepening the scenarios and techno-economic results
 - Elements for policymakers and action plan development



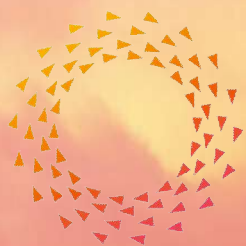
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How could Finland benefit from the energy transition? Who are the key actors to be considered?



Key actors in four different futures - alternatives suggested

Significance	Radical startups	Value-driven techemoths	Green DIY engineers	New consciousness
"Most important"	Startup(s), companies	Companies, techemoths, energy	Communities, people	People, global, nature
"Intermediately important"	new, media, investors, consumers, workers, enterprises, freelancers, entrepreneurs, cities	large, corporations, civil, people, society, google, global, states, apple, technology, big, citizens, sector, samsung, rich	diy, amateur, local, self-sufficient, engineers	everything, individuals, systems, millennials, citizens, society, humans, biophilia, energy, system, connected, communities, eu, parts, organisations

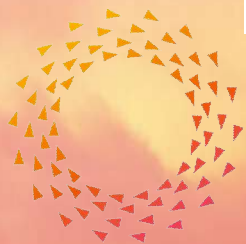


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* Based on FP1 analysis of scenario narratives built by FFRC, UTU

Characterization of the actor viewpoint

	Radical startups	Value-driven techemoths	Green DIY engineers	New consciousness
Who	"Startups" Small-scale actors	"Large companies"	"DIY engineers", People, communities, Local governance	"All", Global networks
How	Value-oriented	Market-oriented	Localised, pragmatic	Value-oriented, international collaboration, interconnectedness
Number of actor types based on word analysis	"Medium"	"Medium"	"Small"	"Large"
Number of actors (decision-making entities) based on storylines	"Many"	"Few"	"Many"	"Many"
Network characterization	Dispersed, Company-company	Sparse, Company-company	Dispersed, localised	Deeply intertwined, wide

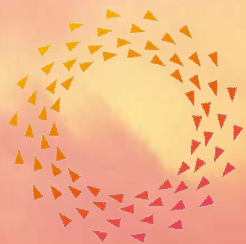


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* Based on FP1 analysis of scenario narratives built by FFRC, UTU

Key actors from the viewpoint of Finland

- Citizen movement actors, new communities
- Newly structured business sector
 - Startup companies
 - Non-energy companies entering the energy business
 - Servicification: Mobility as a Service, energy as a service
- The role of international and national funds, crowdfunding
- Several technological developments identified as enablers/drivers for actors
 - Electric Vehicles
 - Storages, distributed and off-grid generation, and artificial intelligence
 - District heating as a Finnish specialty
 - Methane synthesis, CO2 capture and utilisation

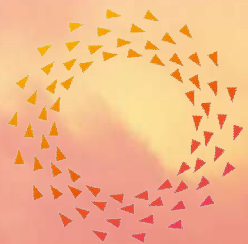


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* Based on FP2 analysis based on expert workshop

Key actions identified

- **Actions under control of Governments highly valued**
 - The next electoral terms and Governmental Programmes as concrete steps for actions in Finland.
 - The toolbox includes e.g. bans on fossil fuels, new INDCs, subsidies or their termination, reforms in taxation, campaigns, refocusing national strategies, R&D support, RE minister, free public transport, boosting ecological lifestyles.
- **Actions targeted at citizens empowered by citizen movements and online communities**
 - The toolbox of actions includes citizen activation and awareness increasing, involvement, concretization, learning, influencing attitudes



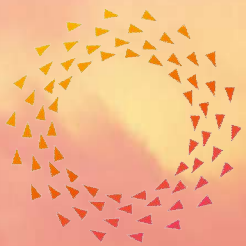
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* Based on FP2 analysis based on expert workshop

Timeline	Ideas about who the actors are that came up in many groups <small>* Based on FP2 analysis based on expert workshop</small>
Existing already	The Neo-Carbon Energy project and brand
	Startups: EkoRent, Joukon Voima, CO ₂ -esto
	Mobility and energy as a service
	Communities (e.g. “Uusi Energiapolitiikka”, Energiaremontti, different Facebook groups, energy producing communities and local food –circles)
	Funds (e.g. Fortum)
2020 - 2030	V2X (from vehicle to X) –EV:s as mobile electricity storage to increase flexibility
	Citizens have become empowered by digitalization (e.g. increased demand response through a mobile application, increased awareness)
	Finland has the image of being an attractive environment for companies and for RES investments, e.g. Tesla cold weather tests, Google data centres..
2050	Cyber security is an important issue and it is connected to the way our societies get their energy; more distributed for safety reasons? Off-grid solutions?
	EV Uber / private car ownership and driving has decreased significantly in the OECD
	Grassroots leaders / communities have more power

Discussion

- Interestingly, the actor elements suggested in the Finnish expert workshop appeared also present in global scenarios prepared in separate process.
 1. Citizens and citizen movement actors strongly reflected in “Green DIY engineers” and “New consciousness” scenarios
 2. Startup companies are – self-evidently – presented in “Radical Startup” scenarios.
 3. Global technology firms often referred to as important for test sites and RES technology investments in Finland, as well as the significance of firms coming outside traditional energy sector. These features are present in “Value-driven Techemoths” scenario



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Summary: new actors shaping the energy future

