sweet swiss energy research for the energy transition

PATHFNDR

Energy System

Integrating detailed electricity grid and sector-coupled energy system models: Soft-linking Nexus-e + SecMOD

Work package 1: Pathways on a national and international scale

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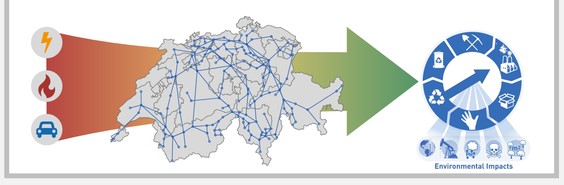
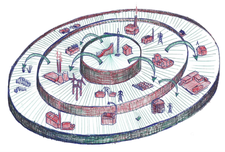
Motivation: Exploiting complementary strengths

SecMOD [1]



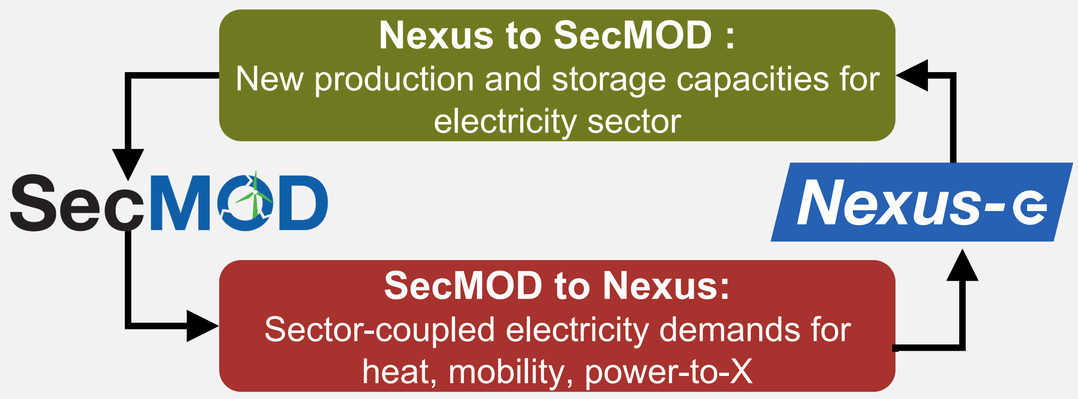
+ Sector-coupled model approach to account for sector dependencies

Nexus-e [2]



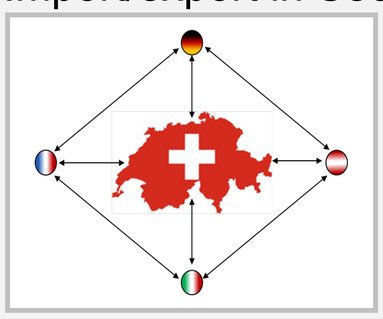
+ Detailed electricity sector model with centralized and decentralized investments

Method: Soft-linking for Swiss transition pathway

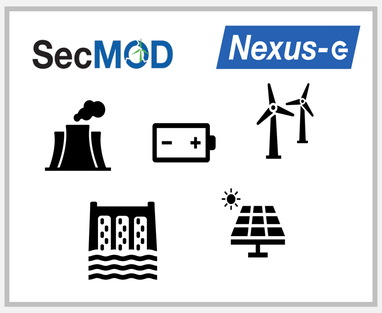


Implementation

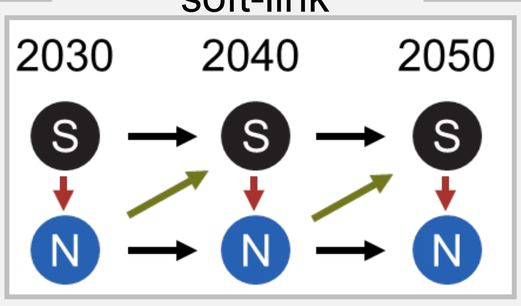
Import/export in SecMOD



Input data harmonization

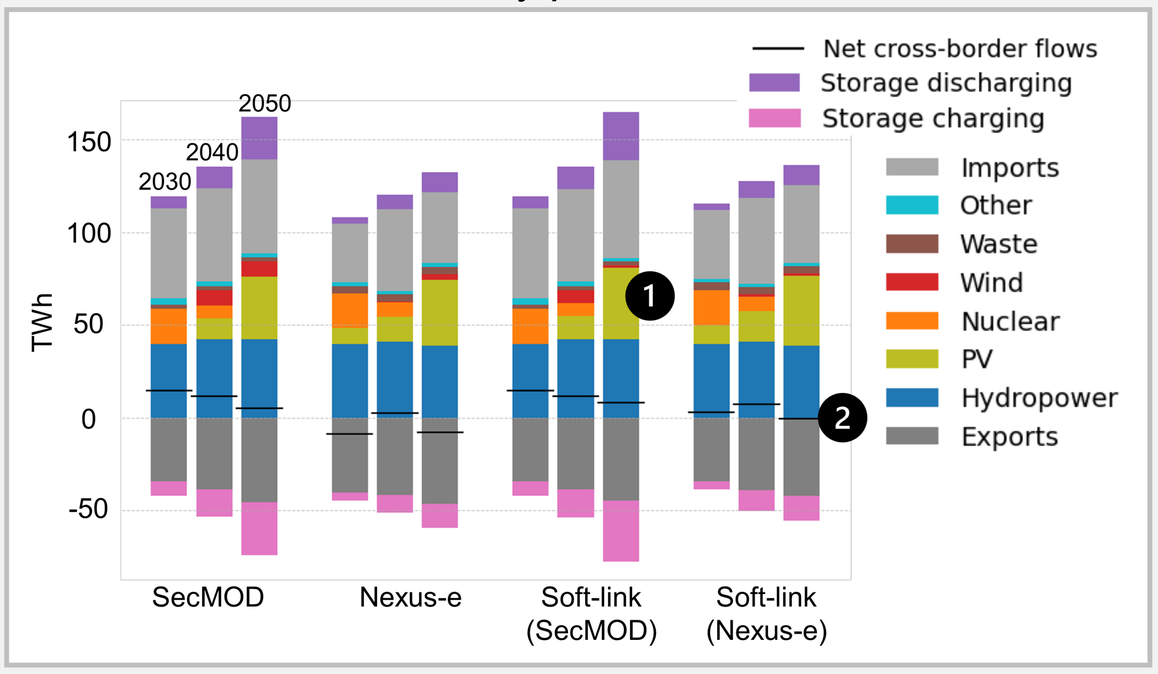


Bi-directional soft-link



Results

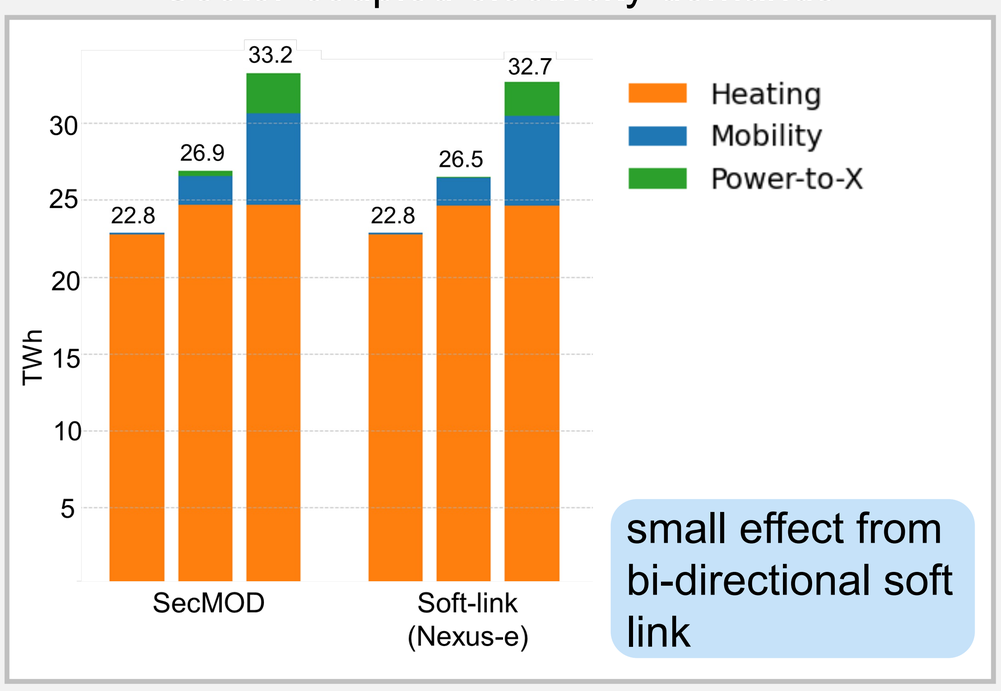
Electricity production



1 Increased PV production

2 Increased net imports

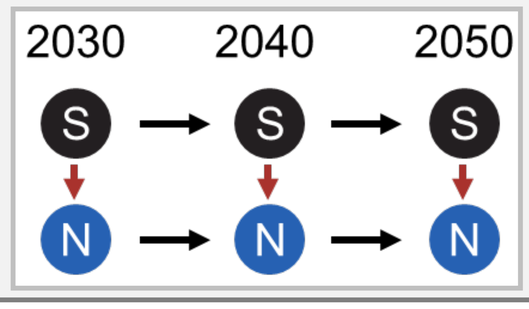
Sector-coupled electricity demands



small effect from bi-directional soft link

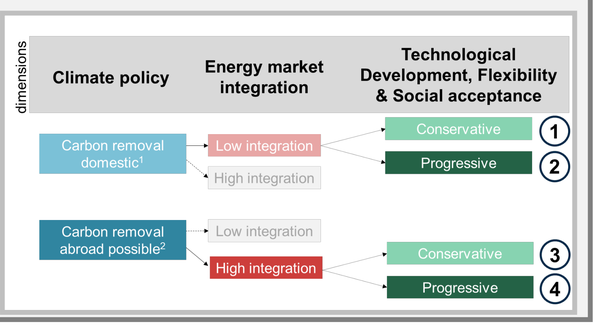
Conclusions

- Sector-coupled demands affect electricity generation
- Installed capacities in electricity sector have limited effect on sector-coupled demands
  → unidirectional soft-link may suffice



Contribution to PATHFDNR

WP1: generate sector-coupled demands for PATHFNDR scenarios using uni-directional link



REFERENCES

1 Reinert C., Schellhas L., Mannhardt J., Shu D. Y., Kämper A, Baumgärtner N., Deutz S., Bardow A. (2022). SecMOD: An Open-Source Modular Framework Combining Multi-Sector System Optimization and Life-Cycle Assessment. Frontiers in Energy Research, 10, 884525.

2 Gjorgiev B., Garrison J. B., Han X., Landis F., van Nieuwkoop R., Raycheva E., Schwarz M., Yan X., Demiray T., Hug G., Sansavini G., Schaffner C. (2022). Nexus-e: A platform of interfaced high-resolution models for energy-economic assessments of future electricity systems. Applied Energy, 307, 118193.

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ACKNOWLEDGMENTS

This work was sponsored by the Swiss Federal Office of Energy's "SWEET" programme and performed in the PATHFNDR consortium.