Abstract: European Energy and Climate Policy has identified strategic energy technologies and designed roadmaps to tackle the individual barriers hindering their effective implementation across Europe. The SET-Plan, the European Union (EU) Energy Roadmap 2050 and various stakeholders’ discussions outlined four main decarbonisation routes for the energy sector, namely: energy efficiency, renewable energy sources, nuclear and carbon capture and storage. In the above framework, a set of alternative pathways were designed by identifying outcomes that conform to the objectives of the EU and the SET-plan, in particular competitiveness and a clean, secure and efficient energy system. These pathways are positioned under two key uncertainties; the level of cooperation (i.e. cooperation versus entrenchment) and the level of decentralisation (i.e. decentralisation versus path dependency). The aim of this paper is to assess these pathways, through the active involvement of relevant stakeholders, according to their performance in key areas, such as the regulatory framework, market maturity, cost/ economic factors, towards a sustainable energy system, by using a multicriteria method. The results could assist European policy makers in drawing recommendations by exploring important elements, drivers and factors of the energy transition and the long term impacts of alternative mitigation options on the economy, the energy sector and technology development.

5. Formulation of multicriteria fuzzy preference degree

\[ \Pi(x_i, x_j) = \frac{\sum_{k=1}^{n} w_k P_k(x_{ik}, x_{jk})}{\sum_{k=1}^{n} w_k} \]

6. Final ranking results from the comparison of Net Flows

\[ \Phi(x_i) = \varphi^+(x_i) - \varphi^-(x_i) \quad \text{where} \]

\[ \varphi^+(x_i) = \frac{1}{m-1} \sum_{j=1}^{m} \Pi(x_j, x_i) \]

\[ \varphi^-(x_i) = \frac{1}{m-1} \sum_{j=1}^{m} \Pi(x_j, x_i) \]

7. Defuzzification of Net Flows based on type

\[ x_{i, fuzz}^+ = \int x_i \cdot \mu(x_i) \, dx_i \]

Applications & Results

For different importance attribution to each DM, different iterations of the methodology where executed.

Findings & Recommendations

- **Consensus** among Decision Makers and iterations.
- **Directed Vision** pathway has outranked all other pathways which means that it faces less risks of failure and has better prospects when implemented.
- Preference towards the progressive over the conservative choices (with positive Net Flows).