Role of households in the energy transition

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NTRANS Annual conference
5. December 2024

NTRANS
Norwegian Centre for Energy Transition Strategies

NTNU SINTEF IFE Institutt for energiteknikk UiO : Universitetet i Oslo VESTLANDSFORSKING Høgskulen på Vestlandet SNF NHH

KSP Behaviour (2020-2025)
Role of energy behaviour in the low-carbon transition

Objective is to map how private households can contribute to the low-carbon transition of the energy system

Interdisciplinary team:

NTNU-KULT, NTNU-PSY, Sintef Industri & IFE

User partners: Enova, Equinor & NVE

Key insights:

- Interdisciplinary collaboration is the key to align the energy behaviour of households with the energy transition
- It is a huge value of more energy actions for households
- But……., we need to think differently to succeed

Role of energy behaviour in the low-carbon transition - Prosjektbanken

Motivation: Households is a large consumer of energy

Inland energy consumption in 2022

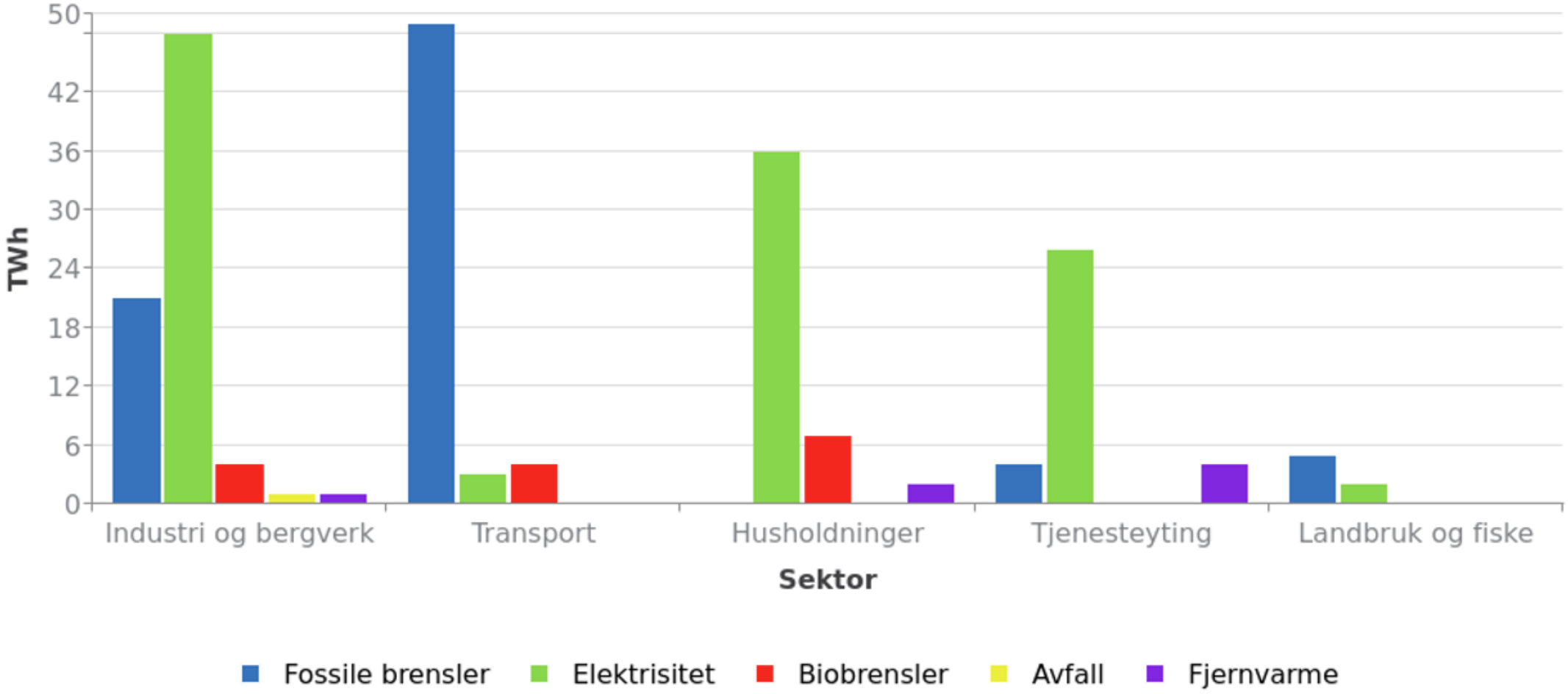
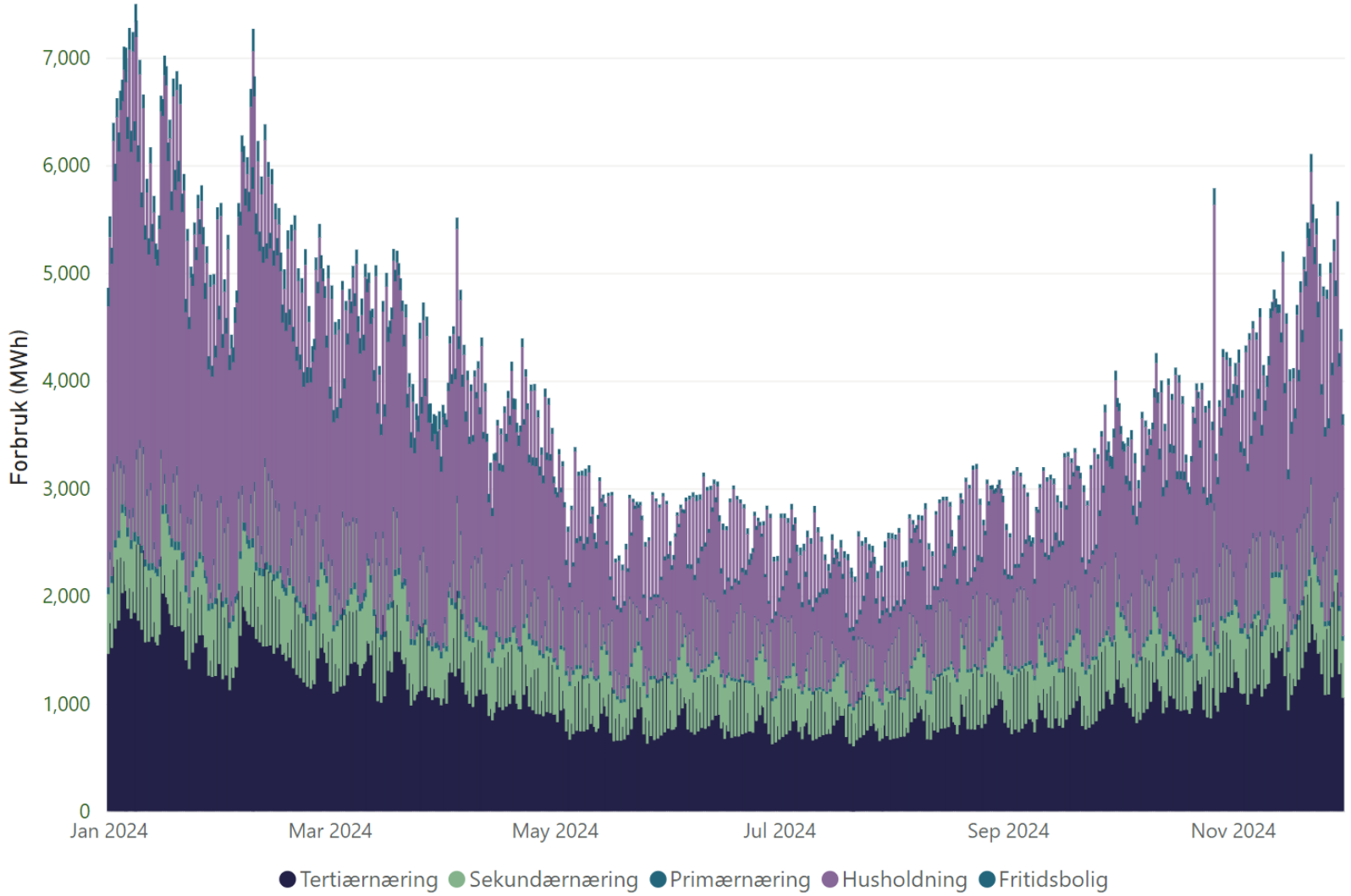


Figure from: Energibruk i ulike sektorer - ENERGIFAKTANORGE

Motivation: Households is a main contributor to electricity peak demand

Figure for NO1 from: Forbruk, produksjon og installert effekt - Elhub

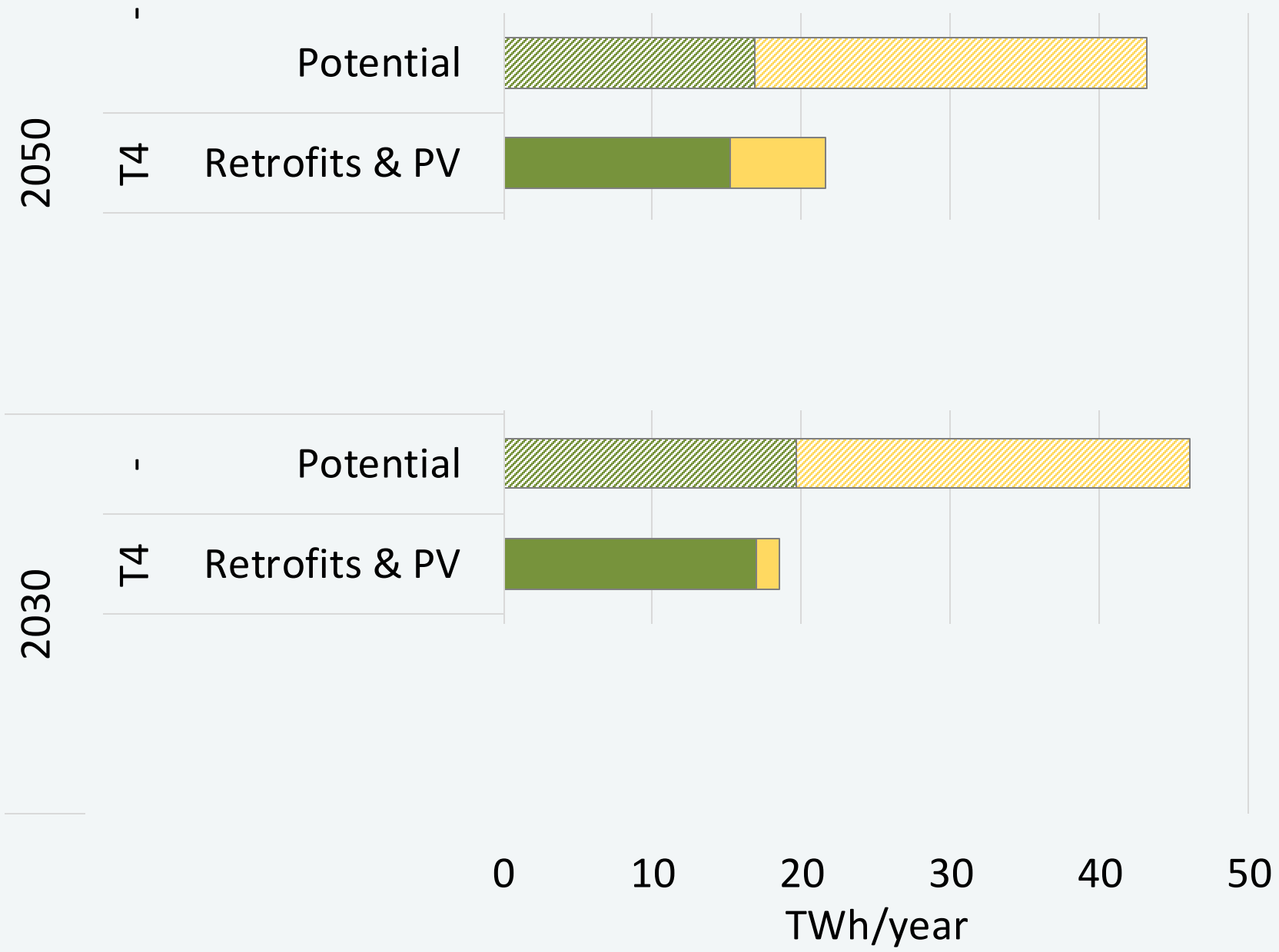


The energy transition is favored by a highly more energy actions from households

- Households is a complex group that have the potential to contribute significant more to the energy transition
  - lowering demand
  - local PV production
  - flexible demand

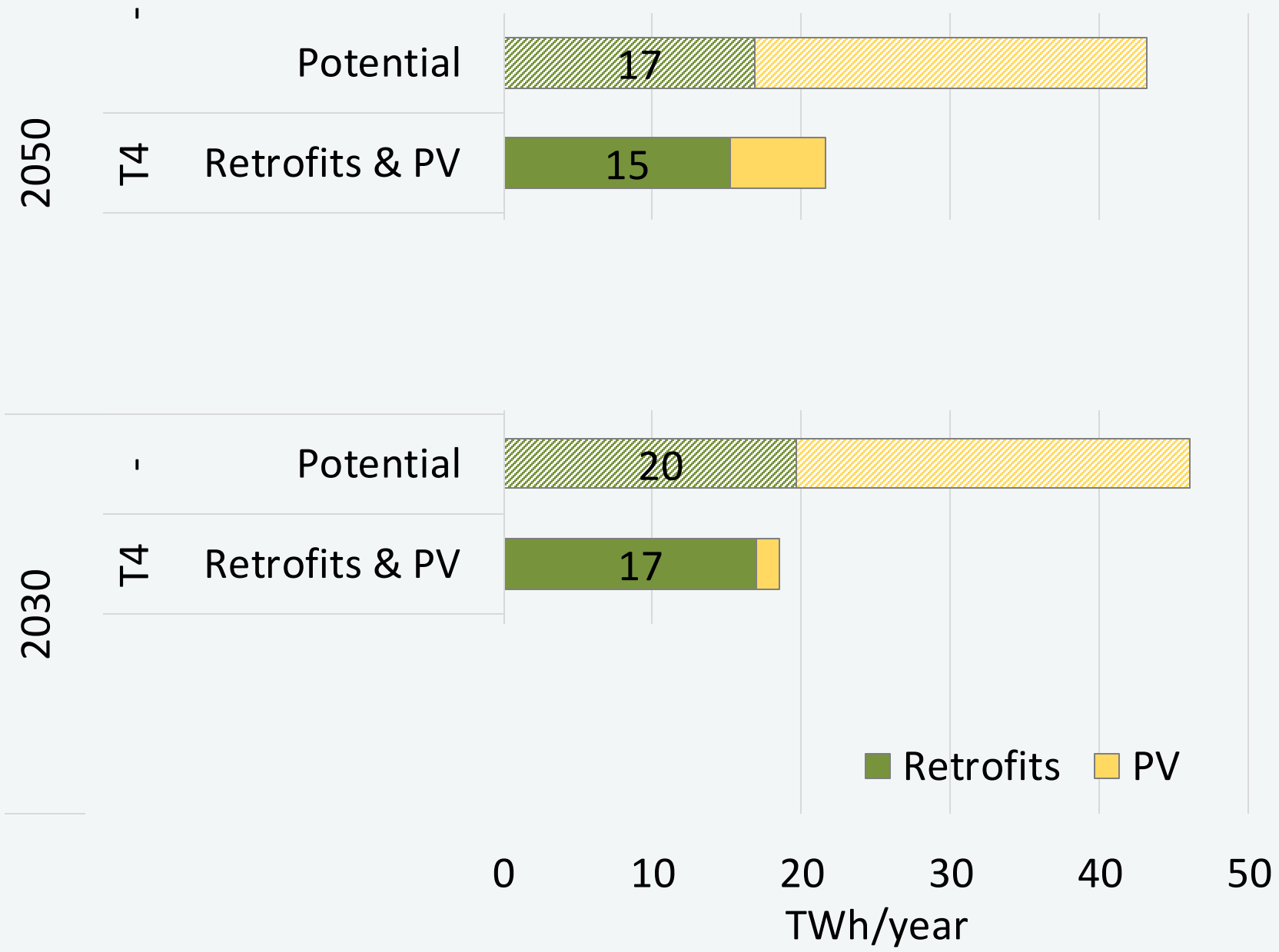
- The benefit of a lower energy consumption and flexible demand is
  - lower energy costs for households
  - lower need for grid expansion and new power
  - facilitate to electrification of fossil fuel consumption in other sectors
  - Integrate renewable, less costly operation of grid + +

Large techno-economic potential for retrofits and local PV



- 2022 Electricity consumption in Norwegian households: 36 TWh
- 31.10.2024: 287 MW PV in households~ 0.3 TWh

Large techno-economic potential for retrofits and local PV



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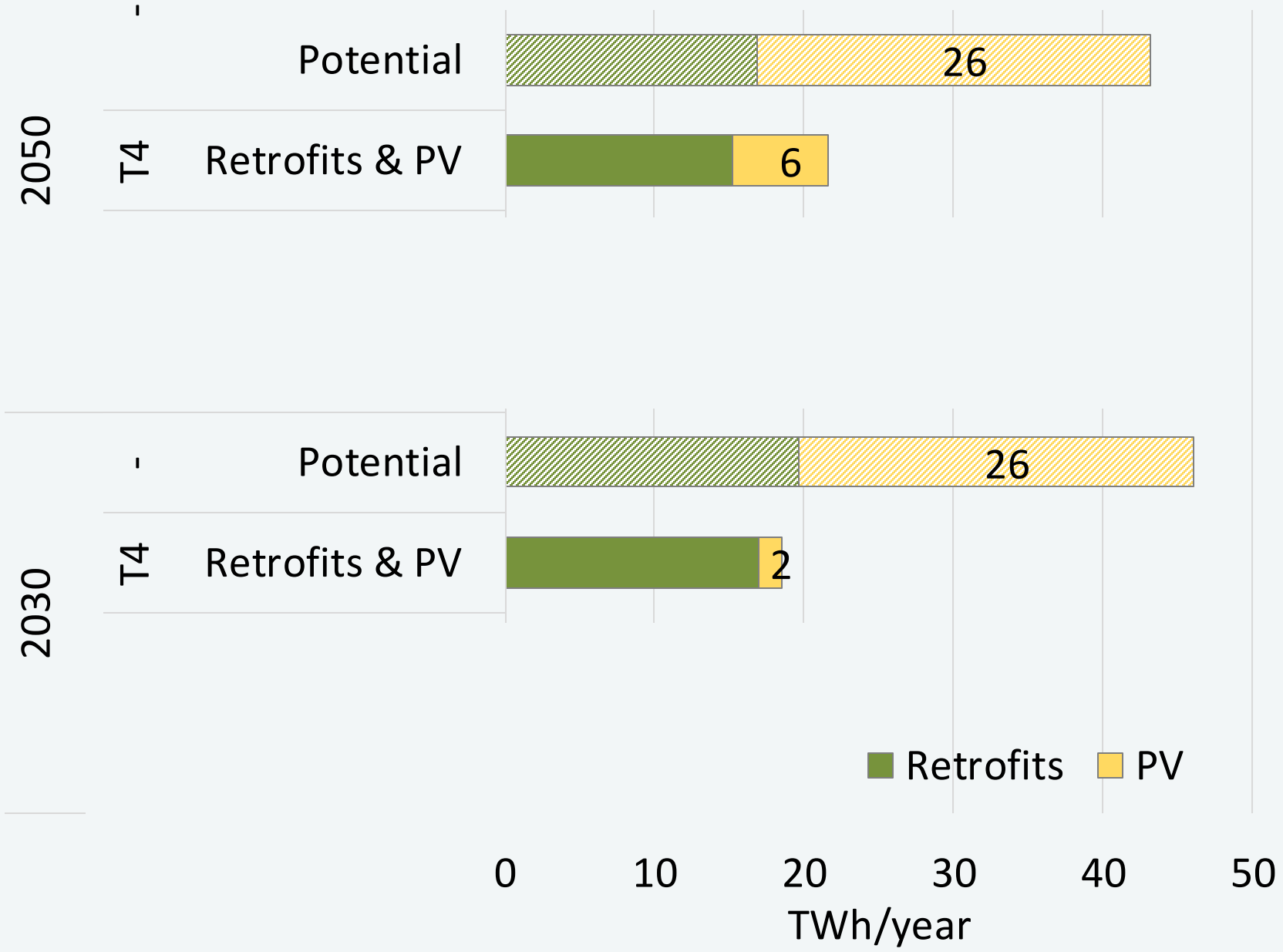

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Retrofits:
Barrierer and drivers

Barrierer:

52% Det er ikke det riktige tidspunktet for etterisolering av min bolig

37% Etterisolering krever mye tid til oppfølging av håndverkere

35% Jeg har ikke tilgjengelige økonomiske ressurser

85% har en eller flere barrierer

Drivere:

52% Etterisolering gir bedre komfort

49% Etterisolering øker markedsverdien av boligen min

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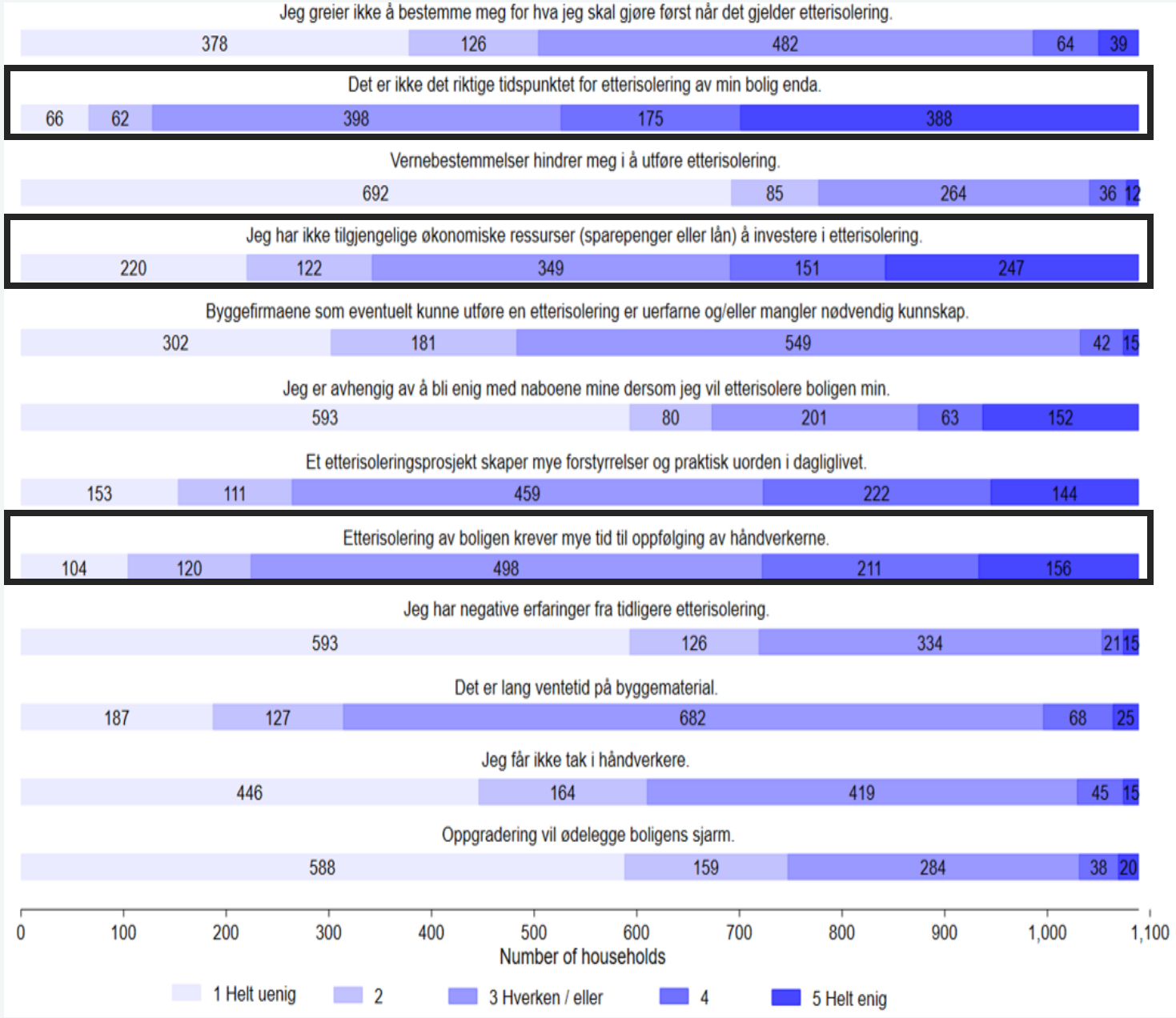
32% Etterisolering medfører betydelige reduksjoner i energiutgiftene mine



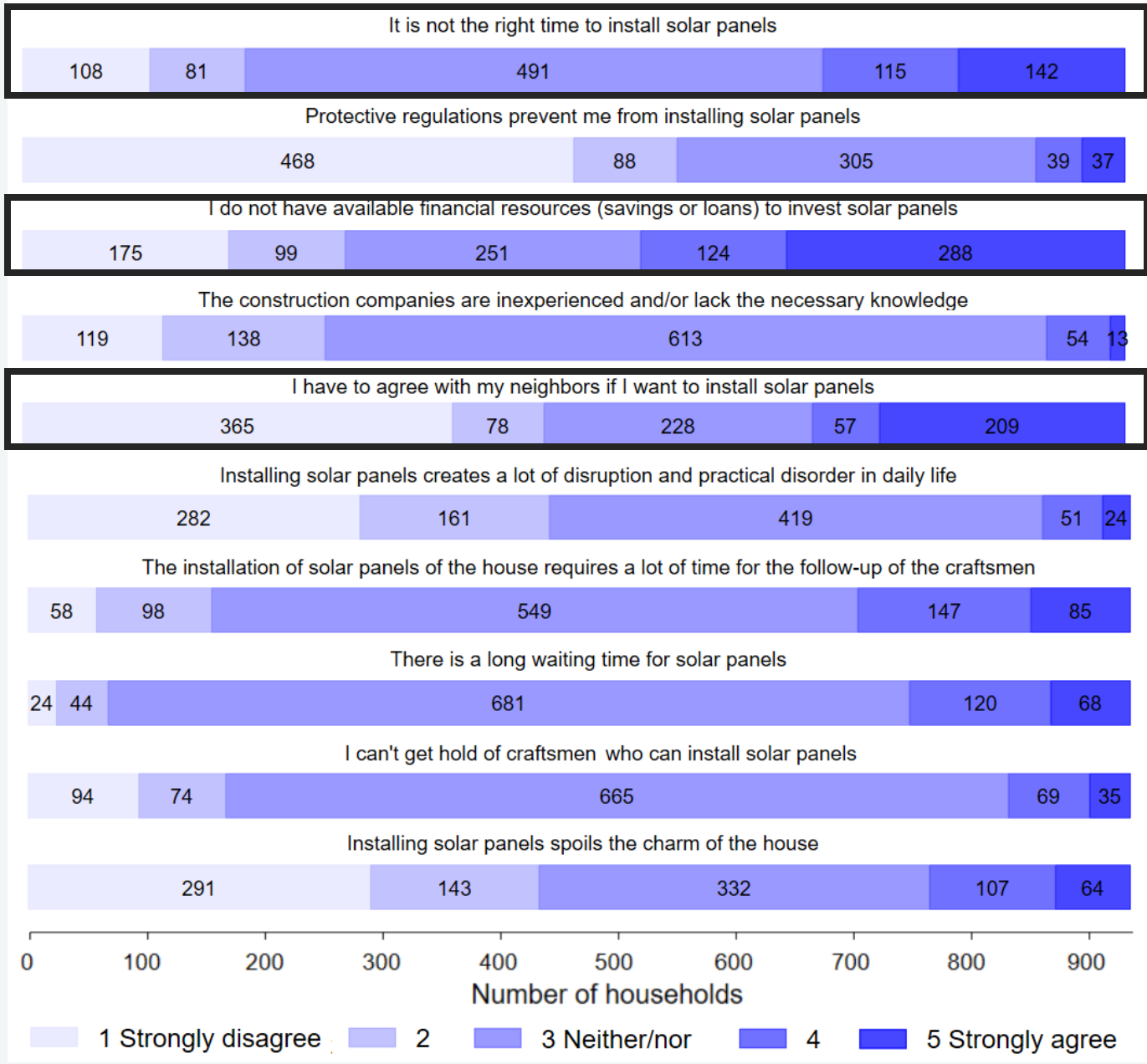
PV:
Barriers and drivers

Barrierer:

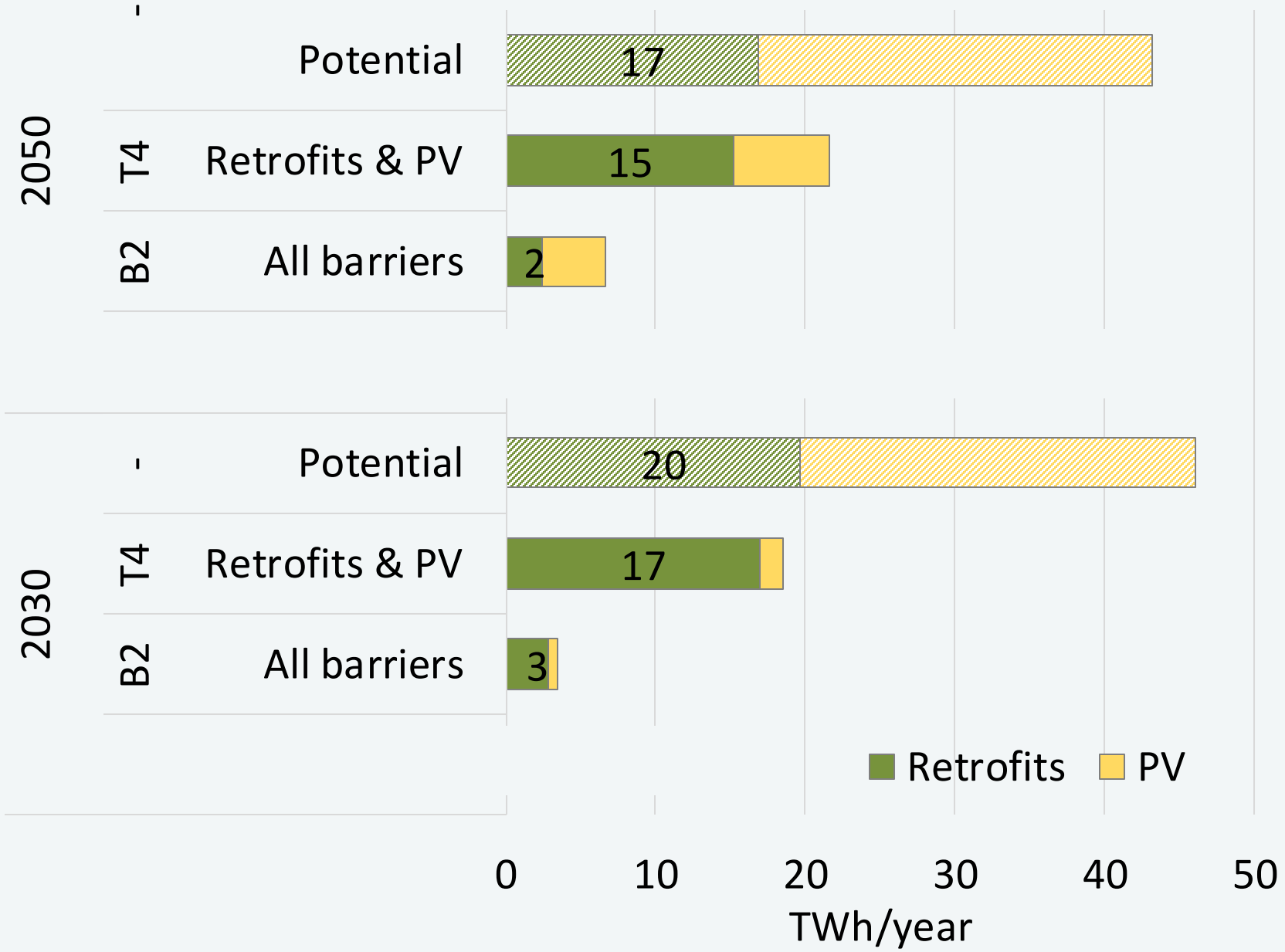
44% Jeg har ikke tilgjengelige økonomiske ressurser
37% Jeg er avhengig av å bli enig med naboene mine dersom jeg vil installere solceller
27% Det er ikke riktig tidspunkt å installere solceller
85% har en eller flere barrierer

Drivere:

50% Det er offentlig støtteordninger for å installere solceller
48% Installering av solceller øker markedsverdien av boligen min
..
38% Solceller medfører betydelige reduksjoner i energiutgiftene mine



Barriers limit retrofits and local PV



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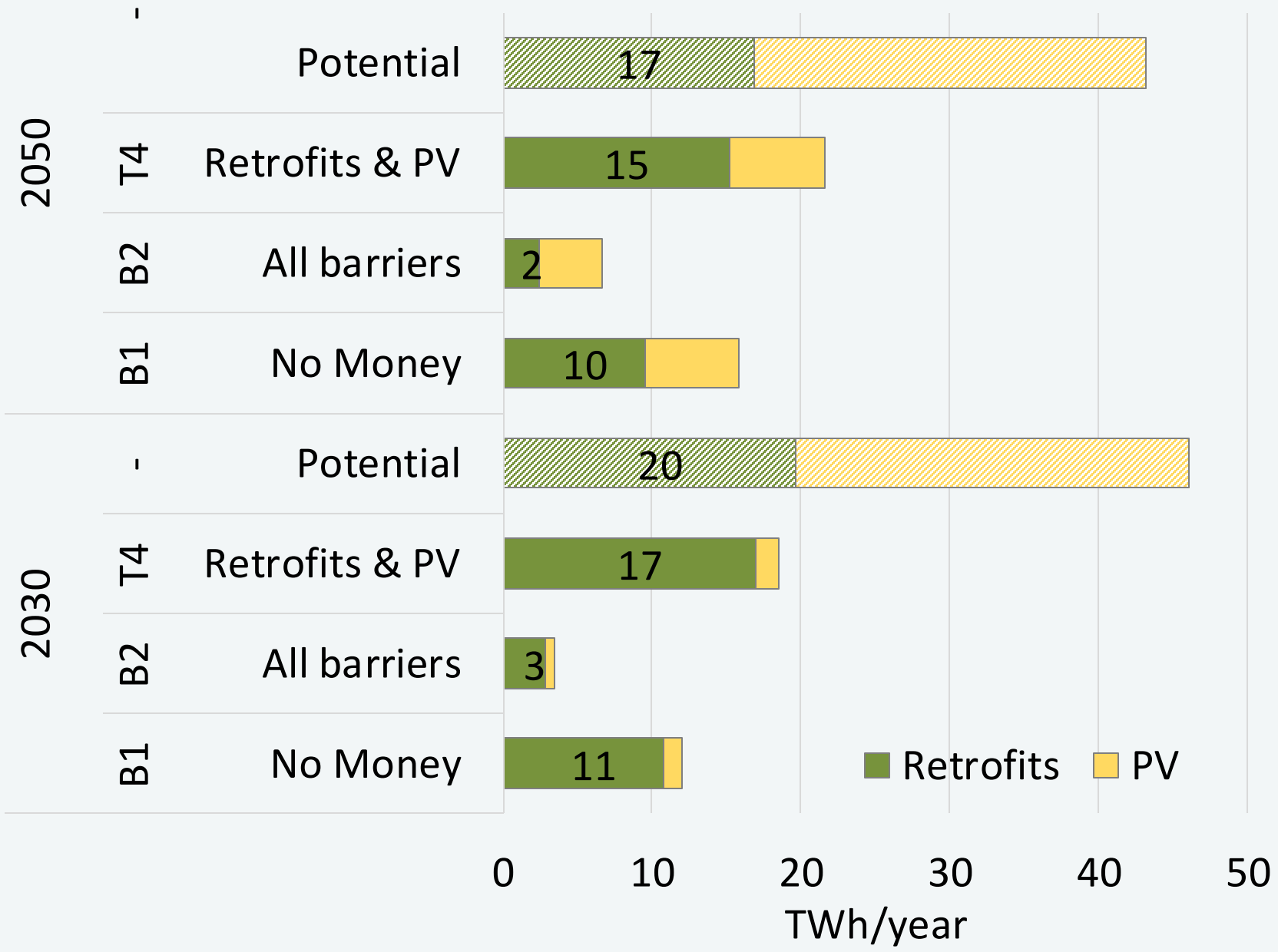
Barriers are more than limited financial resources



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Energy system value of removing barriers

Socio-economic budget of removing barriers

Financial barriers :	76 milliarder kr - 2,5 milliarder kr per year
All barriers :	186 milliarder kr - 6,2 milliarder kr per year

State budget 2025:

4,8 milliarder	Strømstøtteordning

Key insights

- Retrofits has a significant value for the households and for the Norwegian energy system
- Past behaviour, future intentions and barriers from the survey clearly indicates that this will not happen without changes of norms, preferences and new measures/ policies
- It is important to both all types of barriers, not only financial barriers to succeed
- Investments and will not be realized with financial support schemes only
  - Simplify implementation & increased awareness is also important

Future solutions

- Interdisciplinary collaboration is the key to align the energy behaviour of households with the energy transition
  - Households is a complex consumer group
  - Household behaviour depend on individual preferences and societal context
  - A focus on technical solutions and economic incentives is not sufficient
  - Representing households as economic rational individuals does not make sense

- To accelerate the household participation, more resources and new types of measures are needed
  - Household measures need to address different income classes
  - We need measures on both sufficiency and efficiency