ESMAP REPORT LAUNCH
Electric Mobility
& Power Systems

Transport electrification

Impact on the power system from the planners side

Impacts of e-mobility on power system: considerations for planners

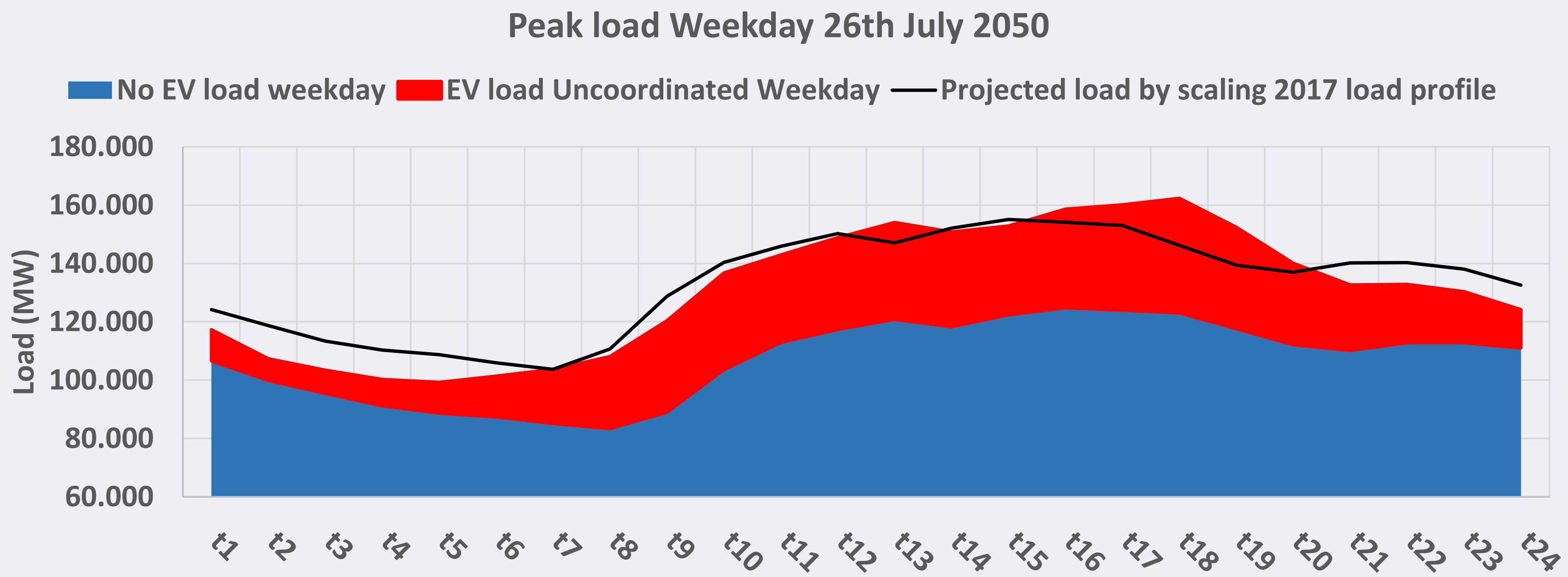
Context

- **Transport electrification (like other end use electrification) leads to two main changes for system balance :**
  - ➢ Higher energy and peak demand
  - ➢ Modification of the load curve
- **Need to be able to identify what those impacts will be for the development of the power system**
  - ➢ EV tool + EPM

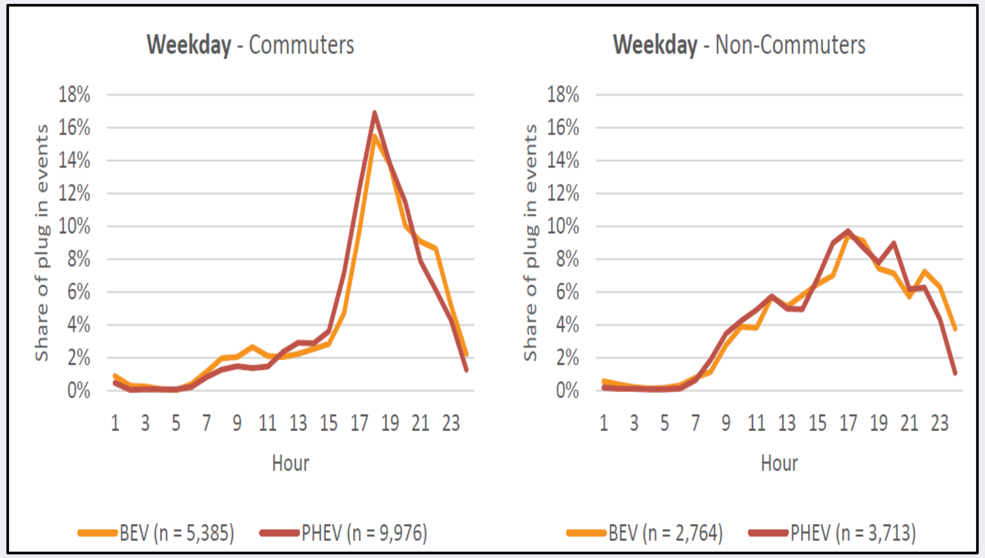
EV tool: translating transport strategies into power demand

EV tool

- **Mileage, Fuel efficiency, EV by type, vehicle fleet growth, share of EVs** ➡ **Projected Total EV load**
- **Assumptions on charging behavior:** Plug in probability profiles, types of vehicles are associated with one or several PPPs
- And **charging speeds** ➡ **Projected hourly load**

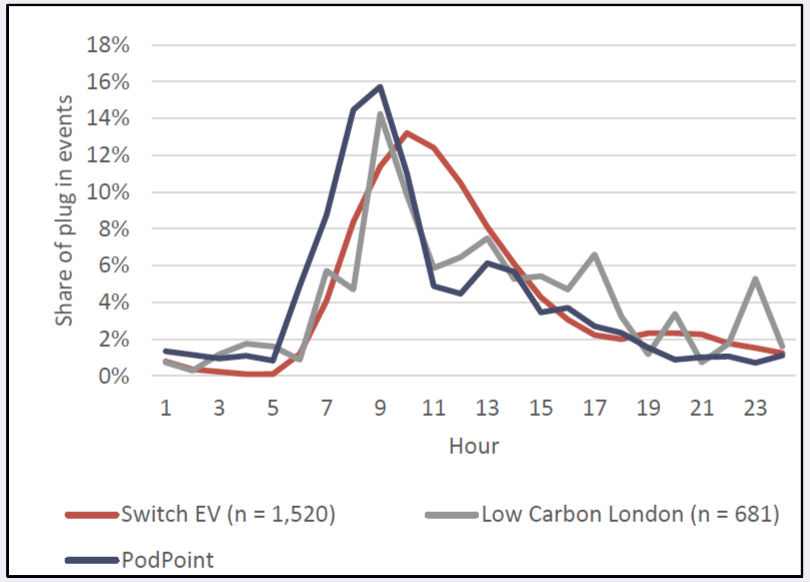


Type of EV: Car, Use: Private (home charging)



Source: UK Charging Behaviour Study Element Energy (2018)

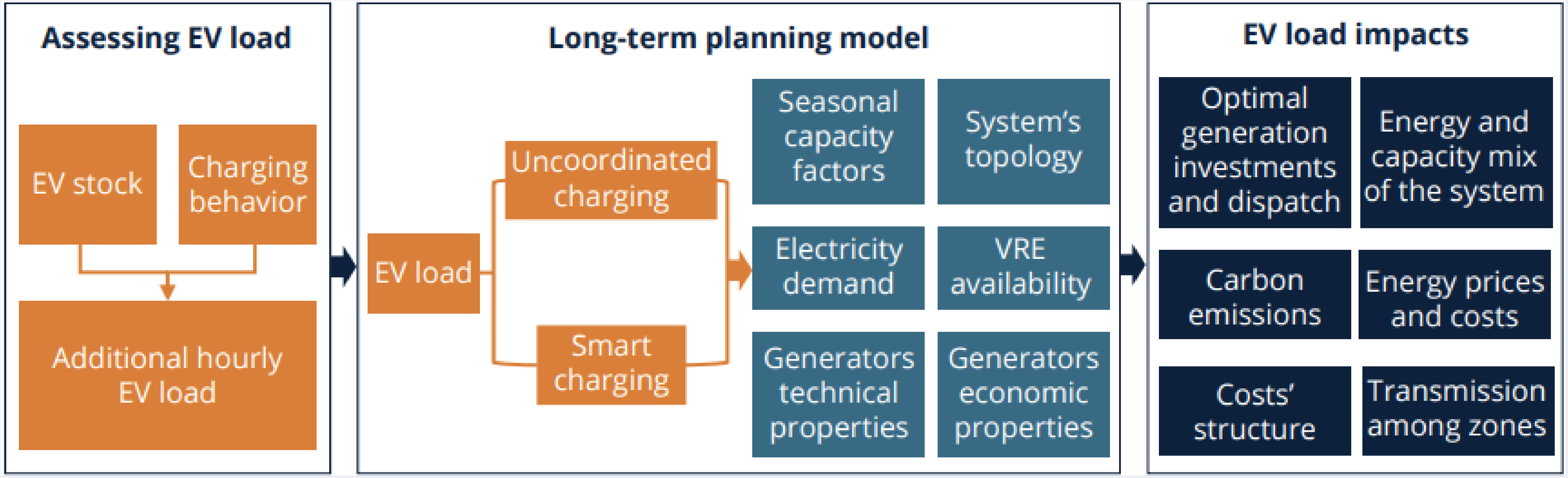
Type of EV: Car, Use: Private (charging at work)



Source: UK Charging Behaviour Study Element Energy (2018)

Assessing which impact matters for decarbonization

CCDR application

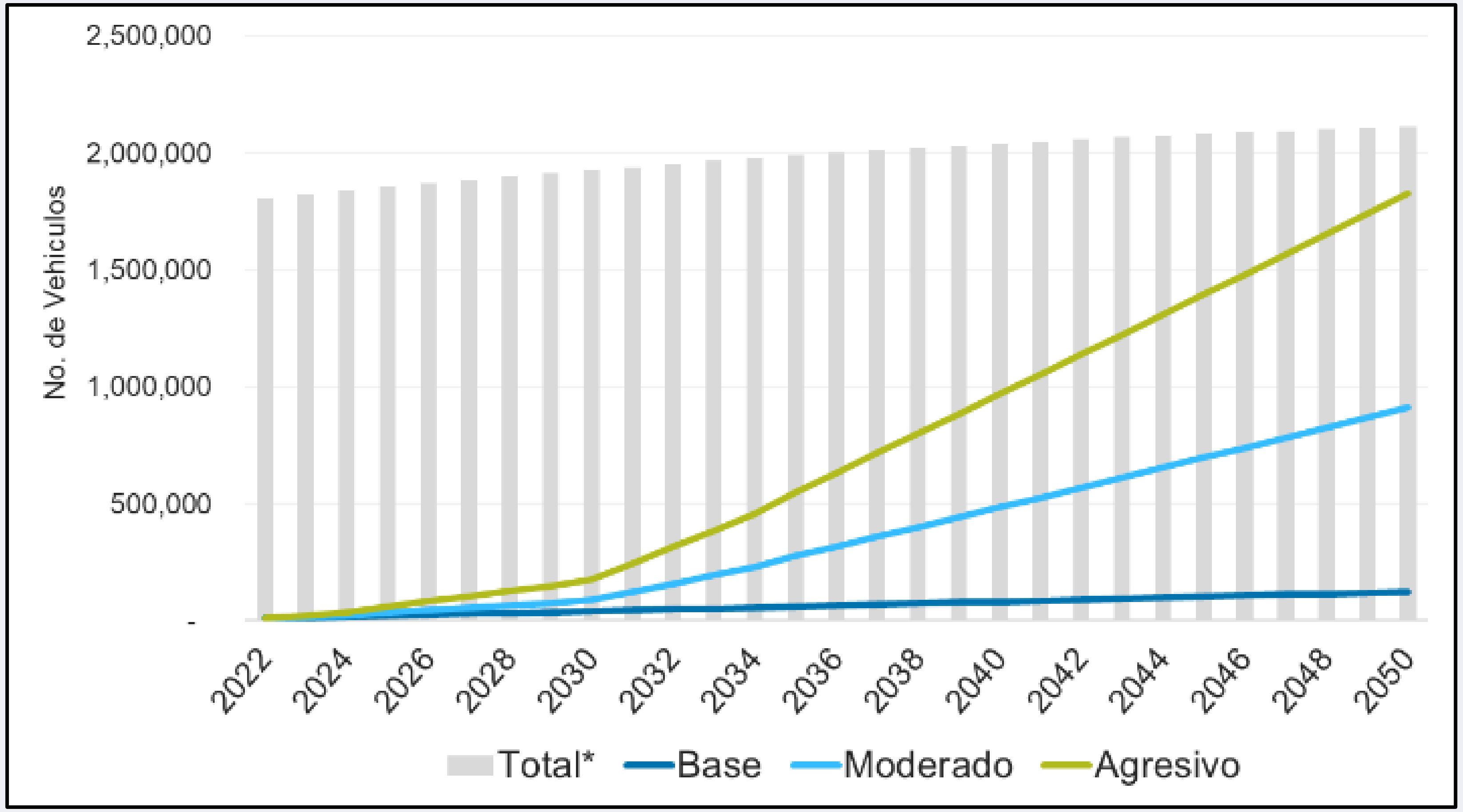


- **In recent long term capacity expansion plans and decarbonization analyses,** we tried to assess :
  - The impact of EV deployment on power generation investment needs and emissions
  - Strategies that would limit the additional costs

The case of Costa Rica: EV fleet

Case : Costa Rica

EV deployment by scenario



Nb of EVs per type

	2021	Base (2050)	Moderado (2050)	Agresivo (2050)
Carros	6,520	80,589	578,166	1,156,331
Taxis	-	764	5,421	10,843
Buses	19	309	2,088	4,176
Buses Especiales	4	62	421	842
Motos	858	27,054	211,157	422,314
Carga Liviana	-	15,675	115,209	230,418
Carga Pesada	-	1	1	1
Total	7,436	126,031	919,466	1,838,932

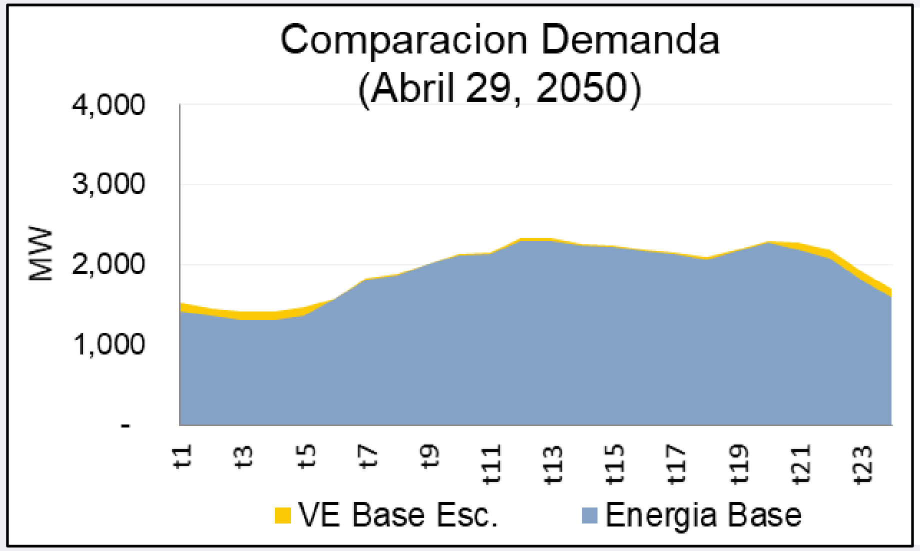
Transport mode

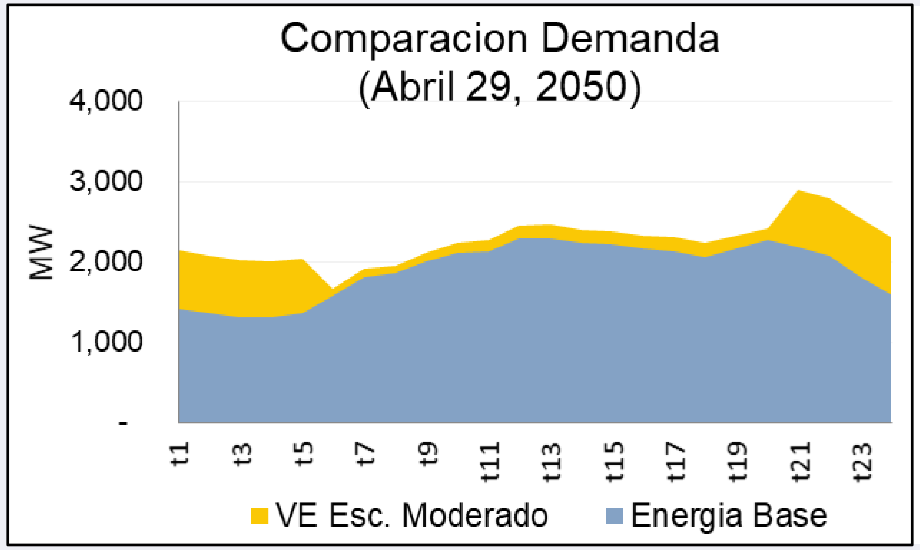
	2030	2035	2050
Transporte Publico (Tren^, Buses, Taxis)	8%	30%	85%
Transporte privado (particulares e institucionales)	8%	30%	95%
Transporte de Carga Liviana	7.5%	Continua adopción	85%

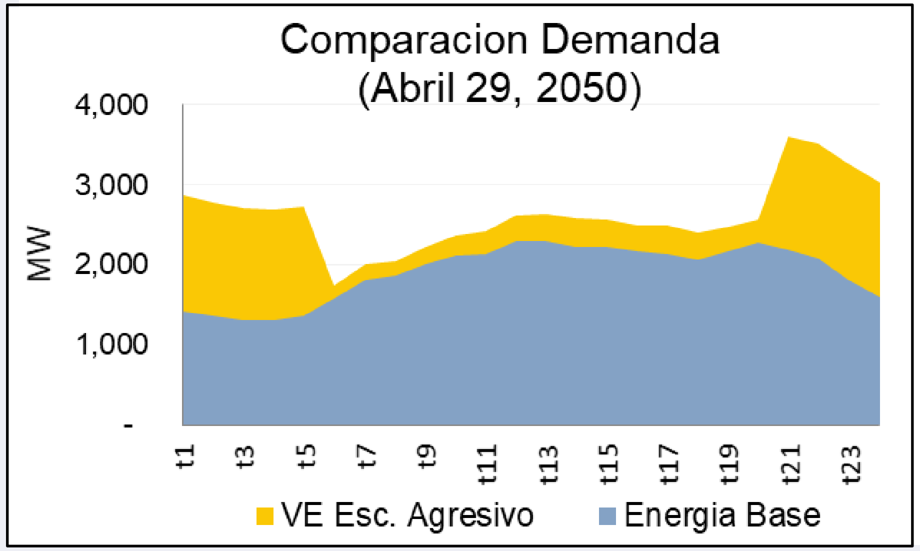
The case of Costa Rica: Load

Case : Costa Rica

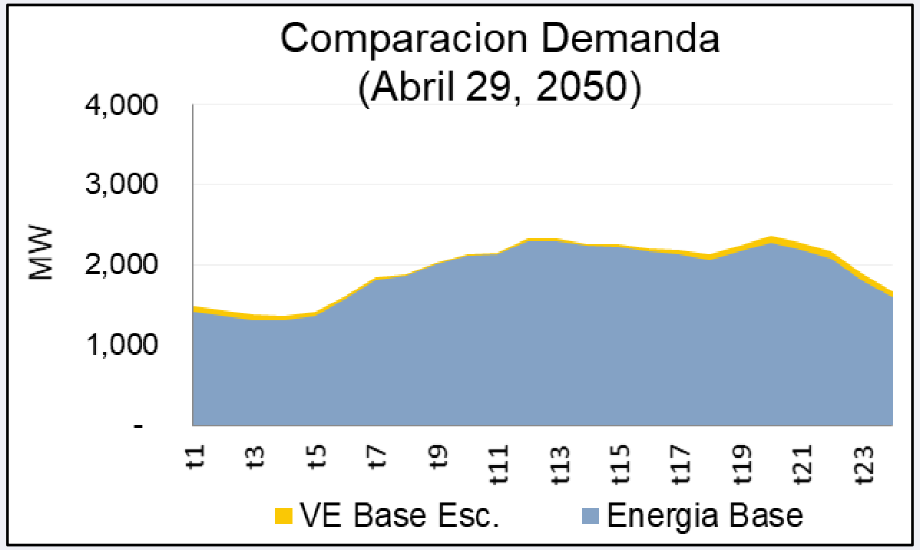
Uncoordinated charging

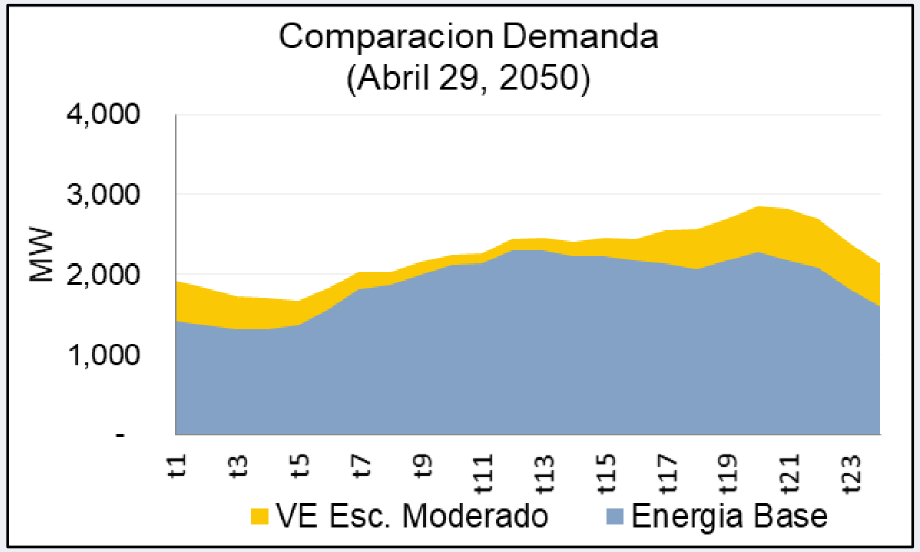


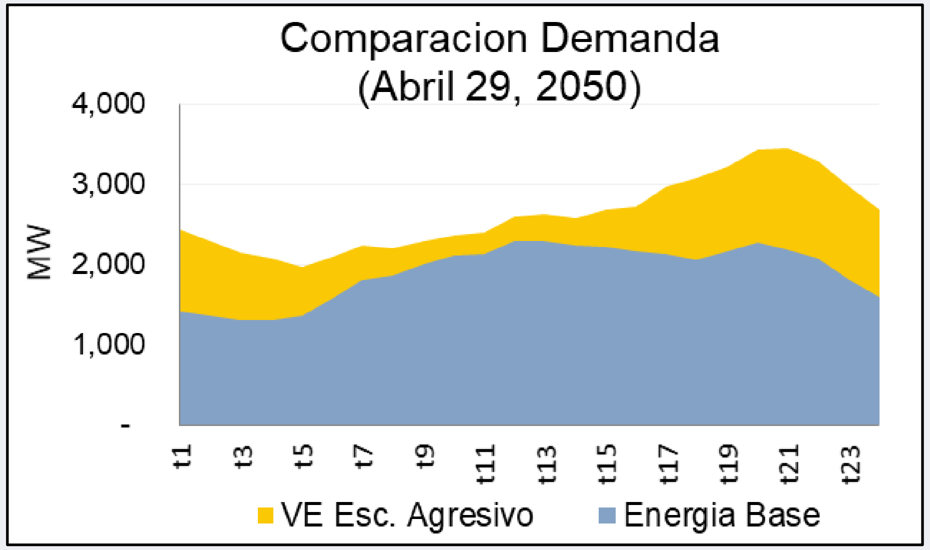




Coordinated charging





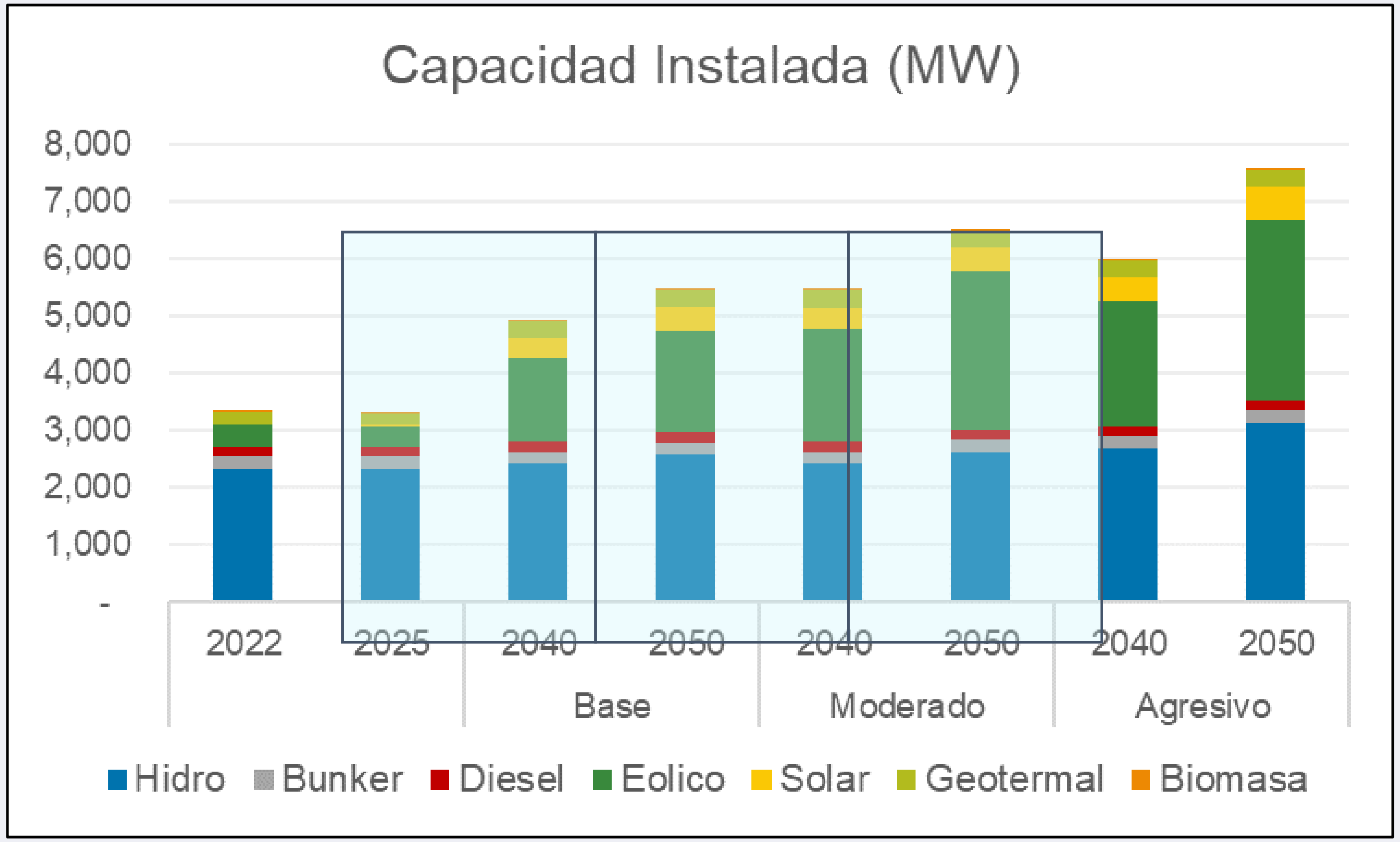


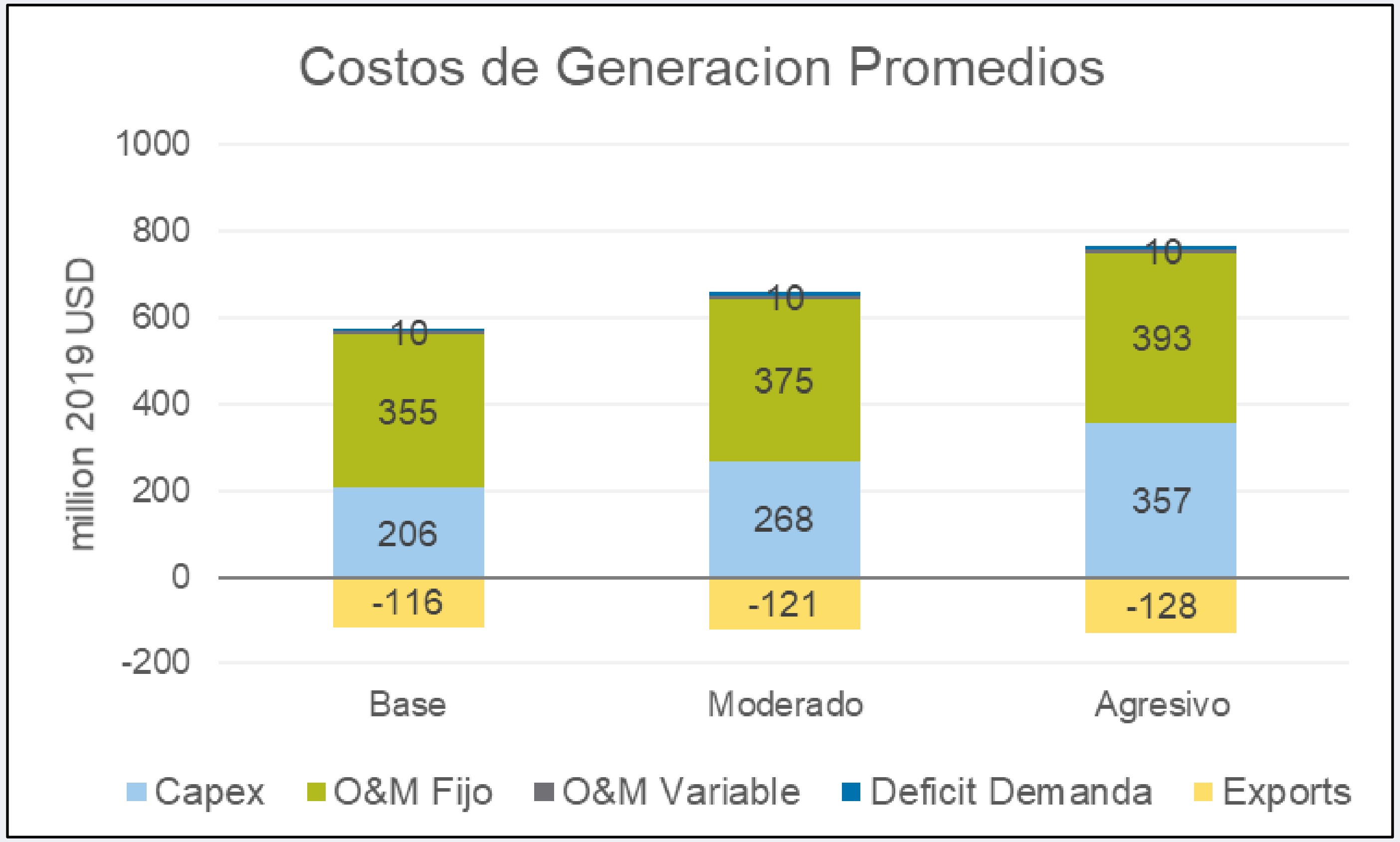
Peak demand 7% lower

Peak demand 11% lower

The case of Costa Rica: Impact on the power system

Case : Costa Rica





Where next?

The end

- Extending the analysis to the grid

- **Analyses with EPM and the EV tool:**
  - This FY, improvement of the EV tool,
  - Include seasonality of EV load variation (e.g. tourism)
  - Co-optimize the power system and coordinated charging