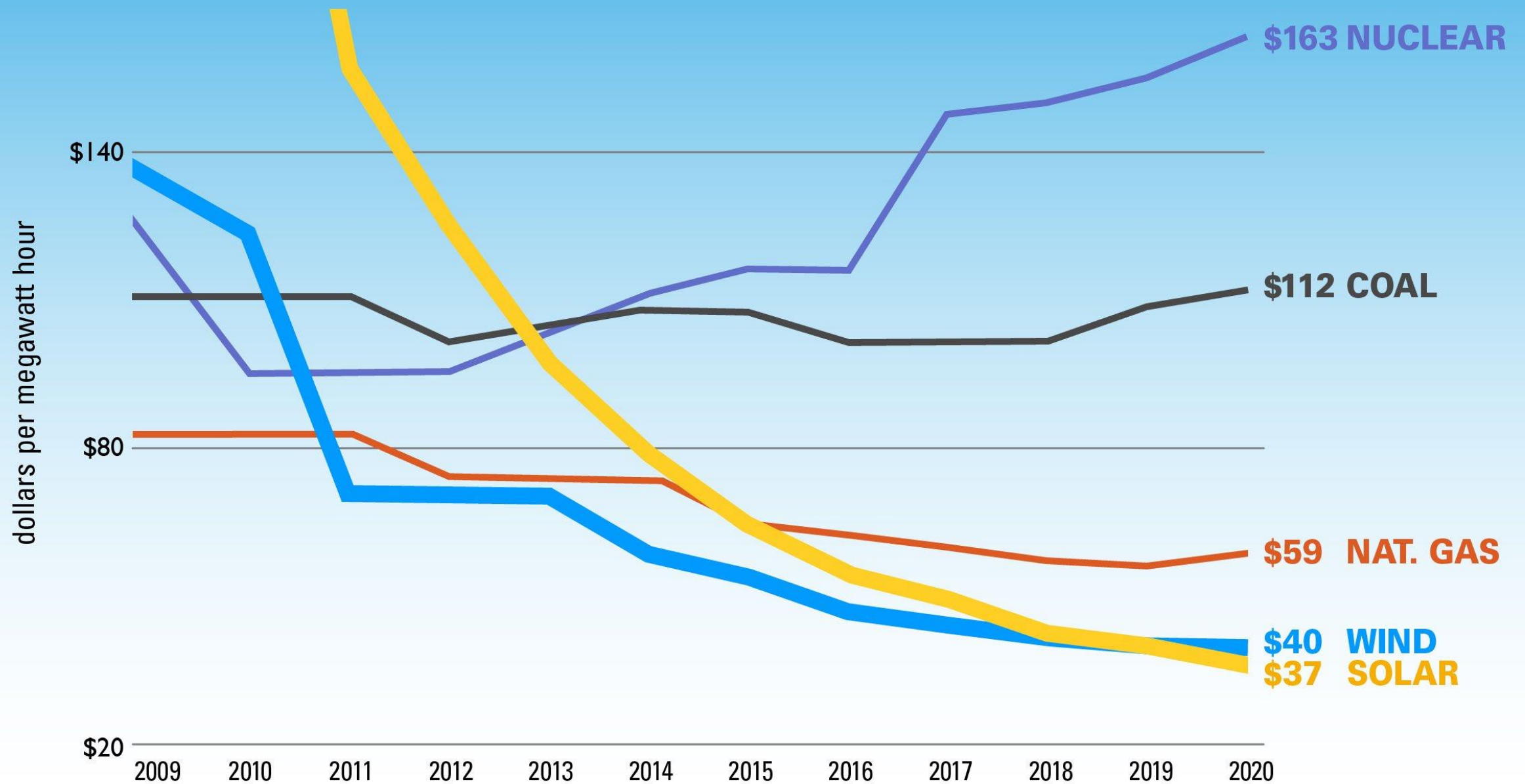


# **Energetska tranzicija**

**Prof.dr.sc. Neven Duić**

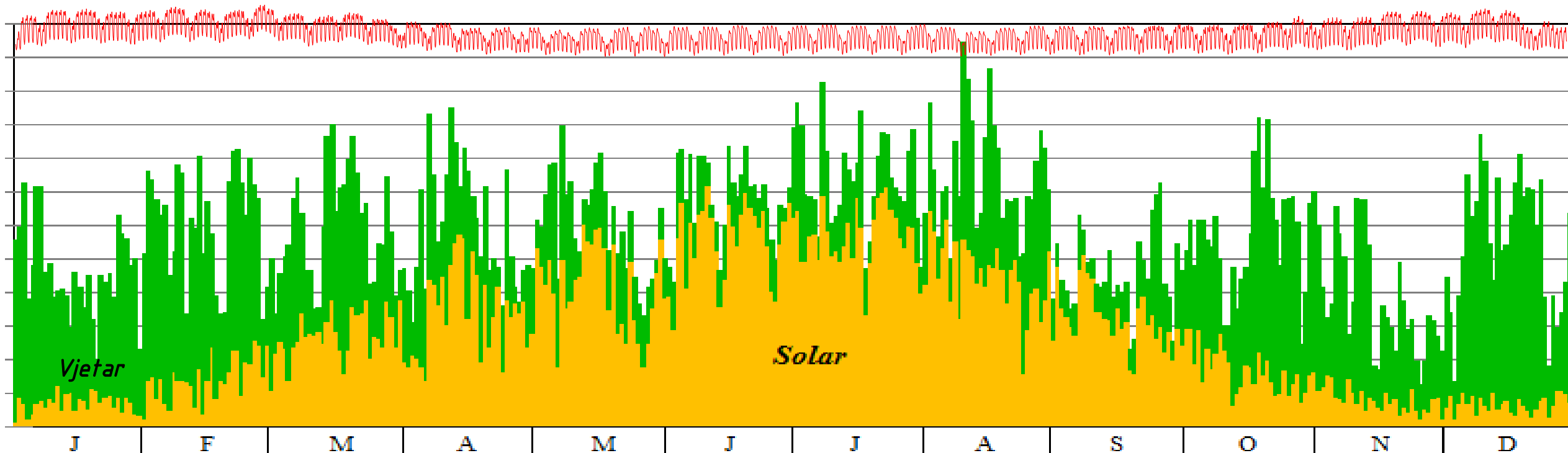
**University of Zagreb  
SDEWES Centre**

# Lazard levelized cost of energy analysis: 2020

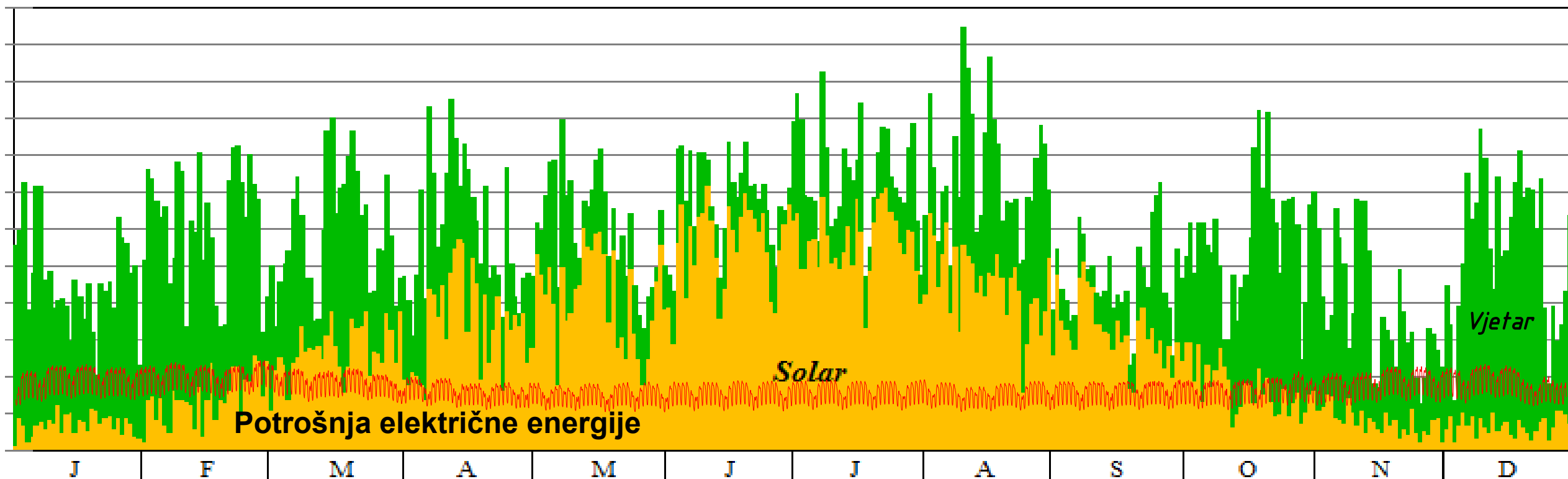


# Kako ćemo napraviti energetska tranziciju na vjetar i solar?

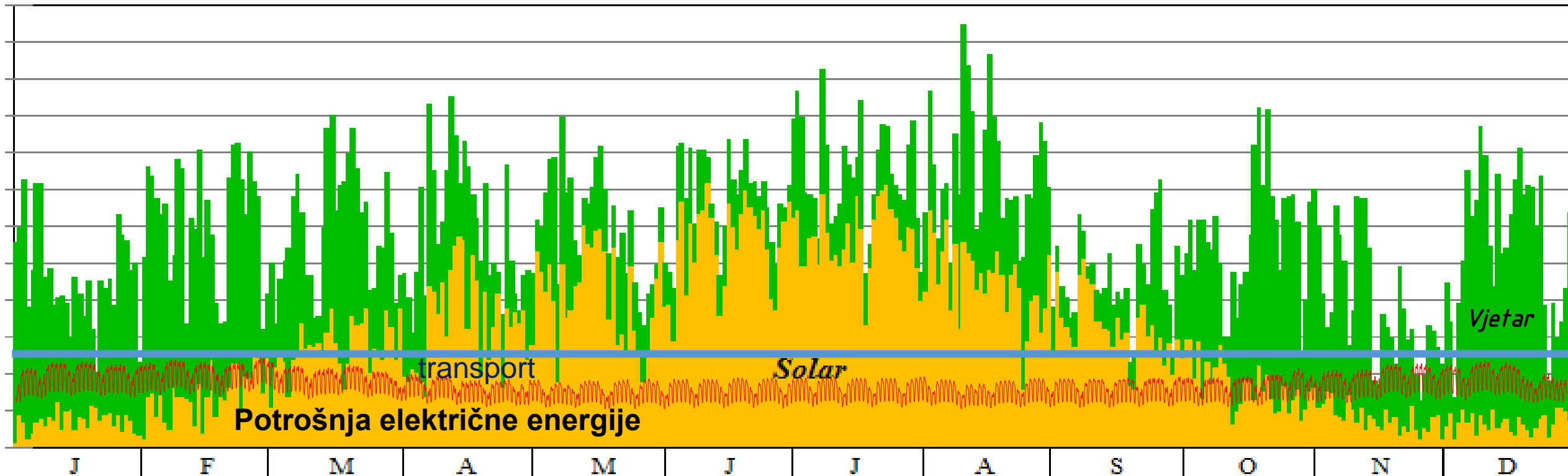
Potrošnja električne energije



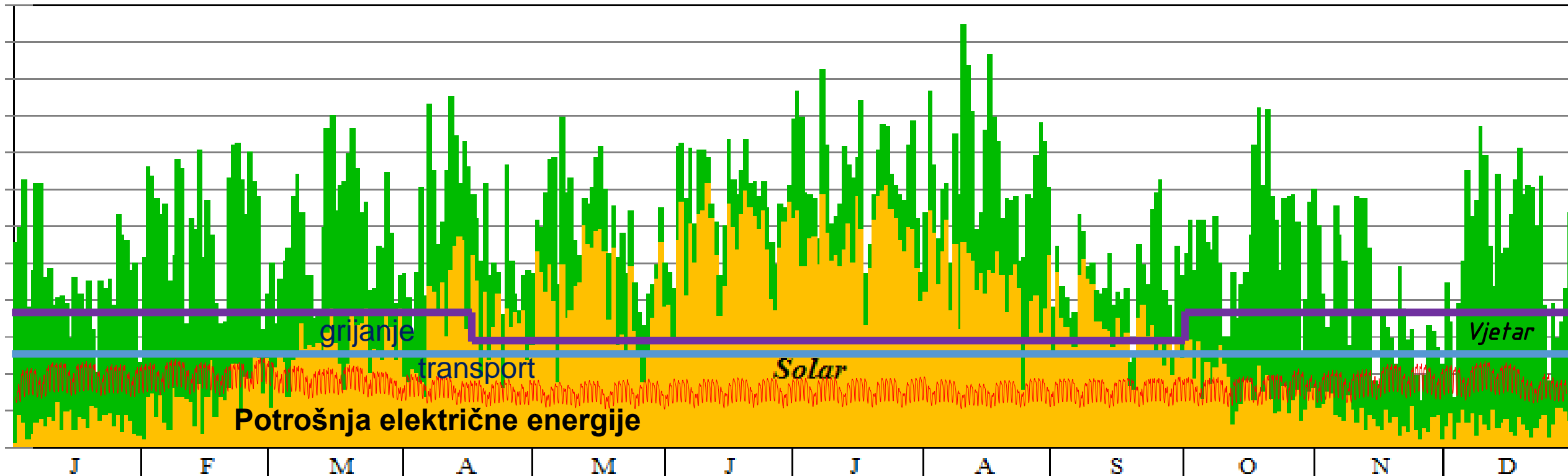
# Što ako izgradimo više vjetra i solar tako da pokrijemo potrošnju?



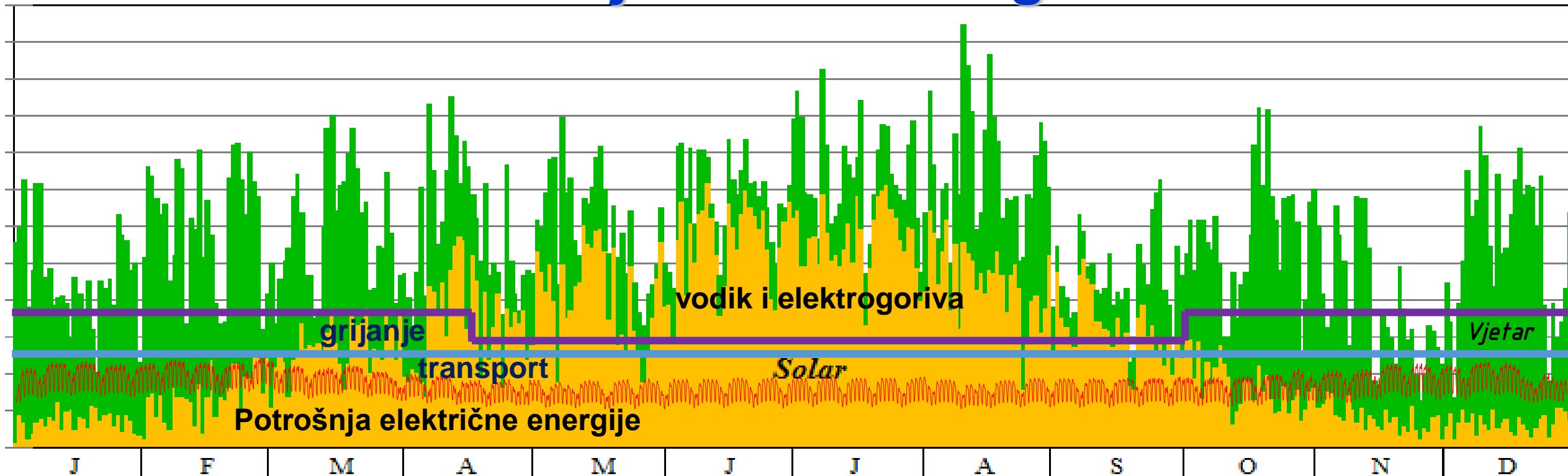
# Što ćemo s viškom struje? Puniti električna vozila



# Što ćemo s viškom struje? Grijati se



# Vjetar i solar su u stvari baseload s viškom, koji možemo koristiti za transport, grijanje i vodik za industriju i električna goriva



## ➤ **How to solve renewables variability/intermittency problem?**

- **More grid interconnection**
- **Flexibilisation of thermal power plants**
- **Wholesale markets coupling**
- **Demand response and integration of power, heating, cooling, transport and water systems – power-to-X**
- **Dedicated electricity storage**



# Demand response – power-to-X

- 20th century energy systems:  
supply follows demand
- 21st century energy systems:  
demand follows supply -> smart  
energy systems



# Barriers to selfsupply PV producers

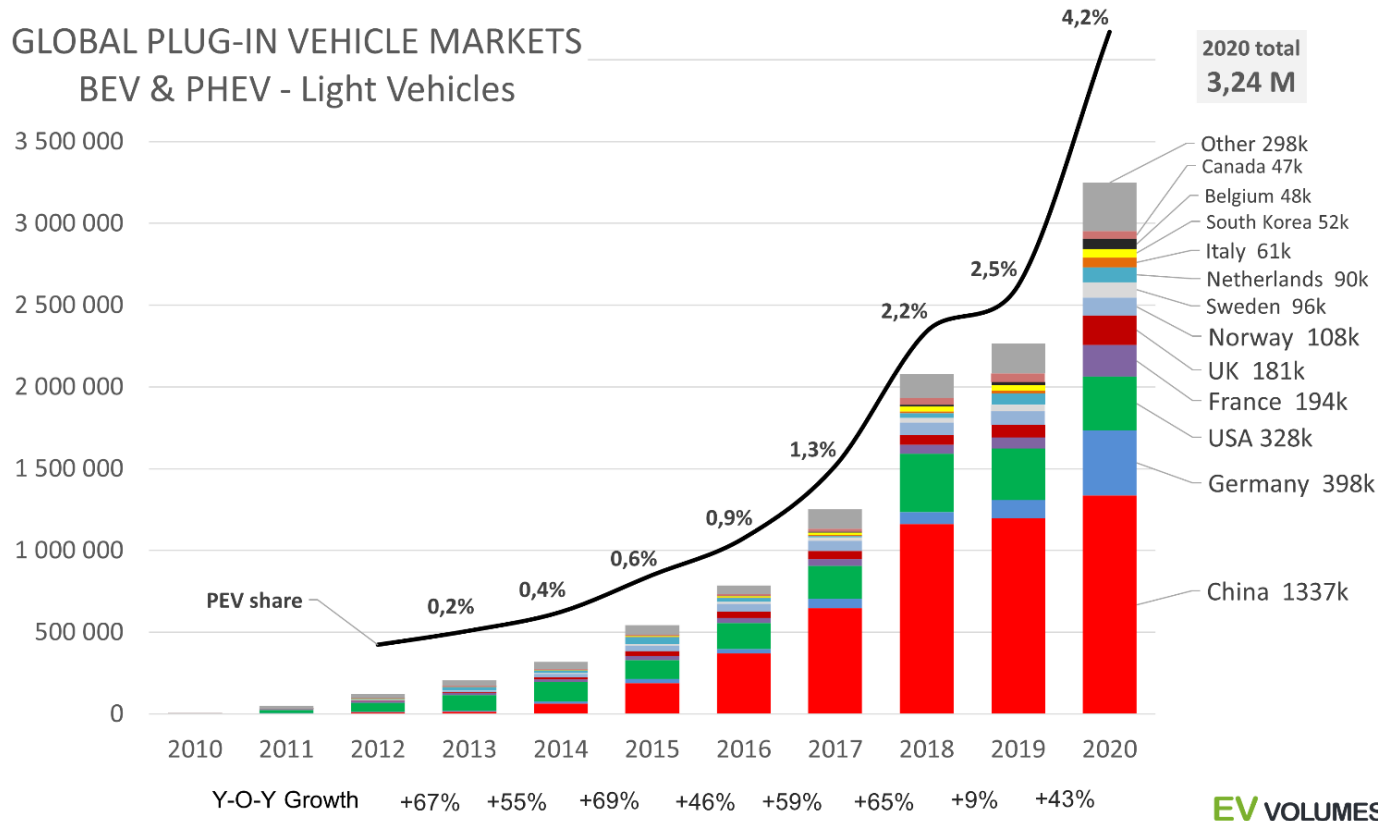
- SDEWES Solar 1 – 2 days to build, 363 days to get papers from HEP
- Lack of licensed workforce
- Price skyrocketed
- 10-fold growth between 2019 and 2020, so problems predictable ...



# What Croatia needs now?

- We need big PV solar plants – feed in premiums
- We need 200 MW new PV a year
- Roofs – we need procedures to be cut down to days
- We need urgent roof PV companies' buildup, startups
- We need more licensed workforce

# Transport electrification has started



## Global light vehicles sales in 2020

- 3.2 mln EV
- 76 mln total
- 4.2% global sales
- 43% EV sales growth
- 20% cars sales fall

EU: 10.5% EV

HR: 2% EV

# What Croatia needs?

- Smart slow charger on every parking place
- Get ready for peak tourist season – when all cars will be EV, we will need 200 fast chargers on each „petrol” station



# NZEB with gas boilers?

- Ban gas boilers ASAP
- Dense urban areas should be connected to DHC
- Individual houses – heat pumps
- Dinamic prices of electricity
- PV roofs
- Heat storage for balancing