



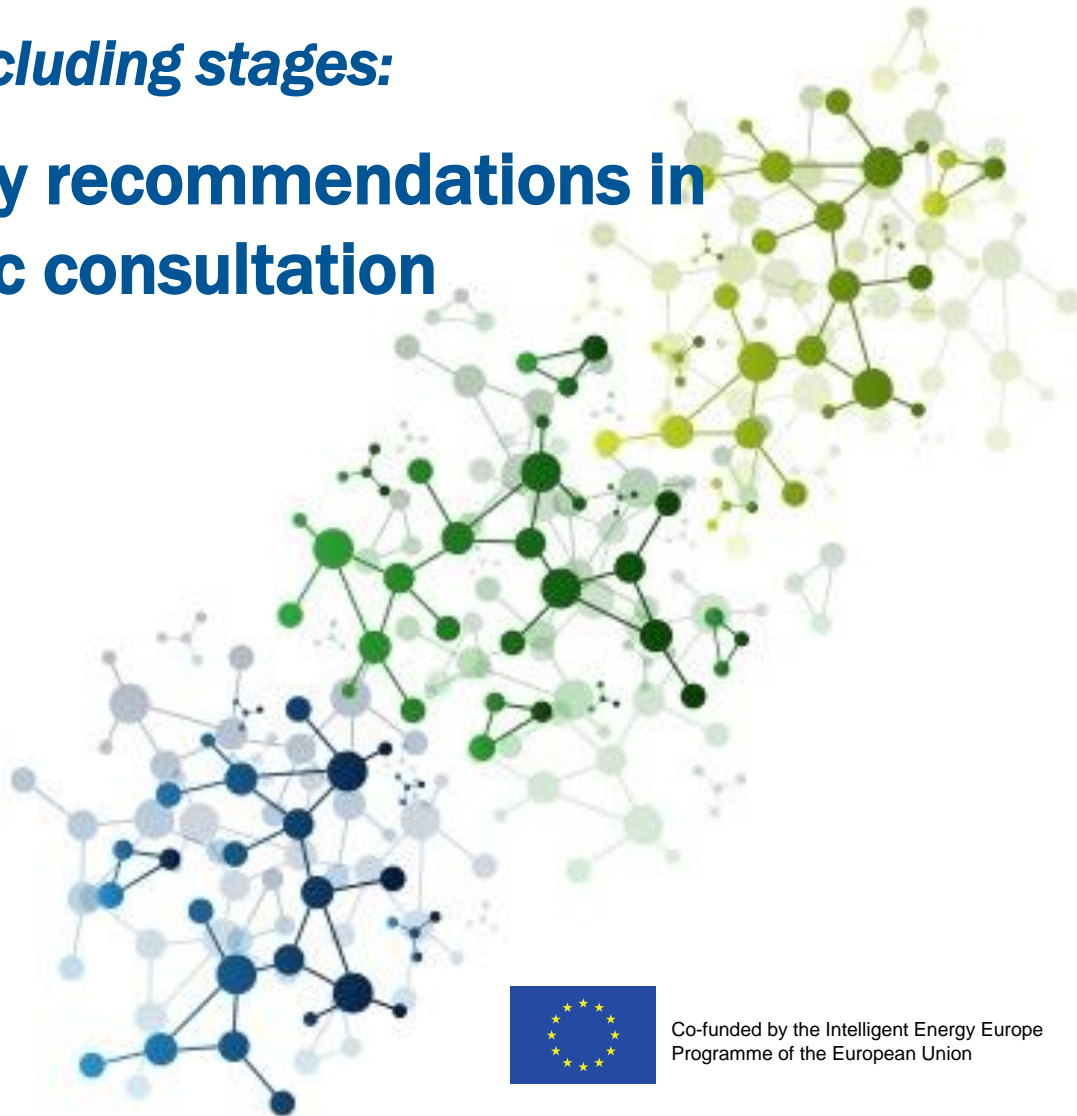
Market4RES project in concluding stages:

Main findings and policy recommendations in view of upcoming public consultation

Expert workshop

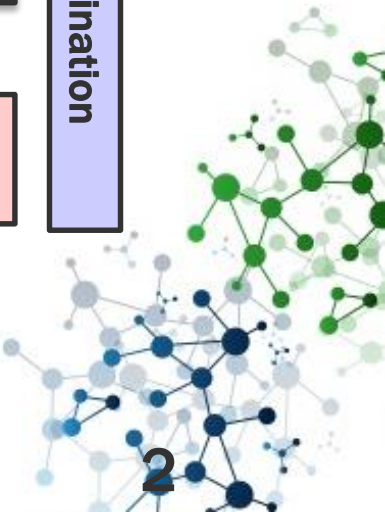
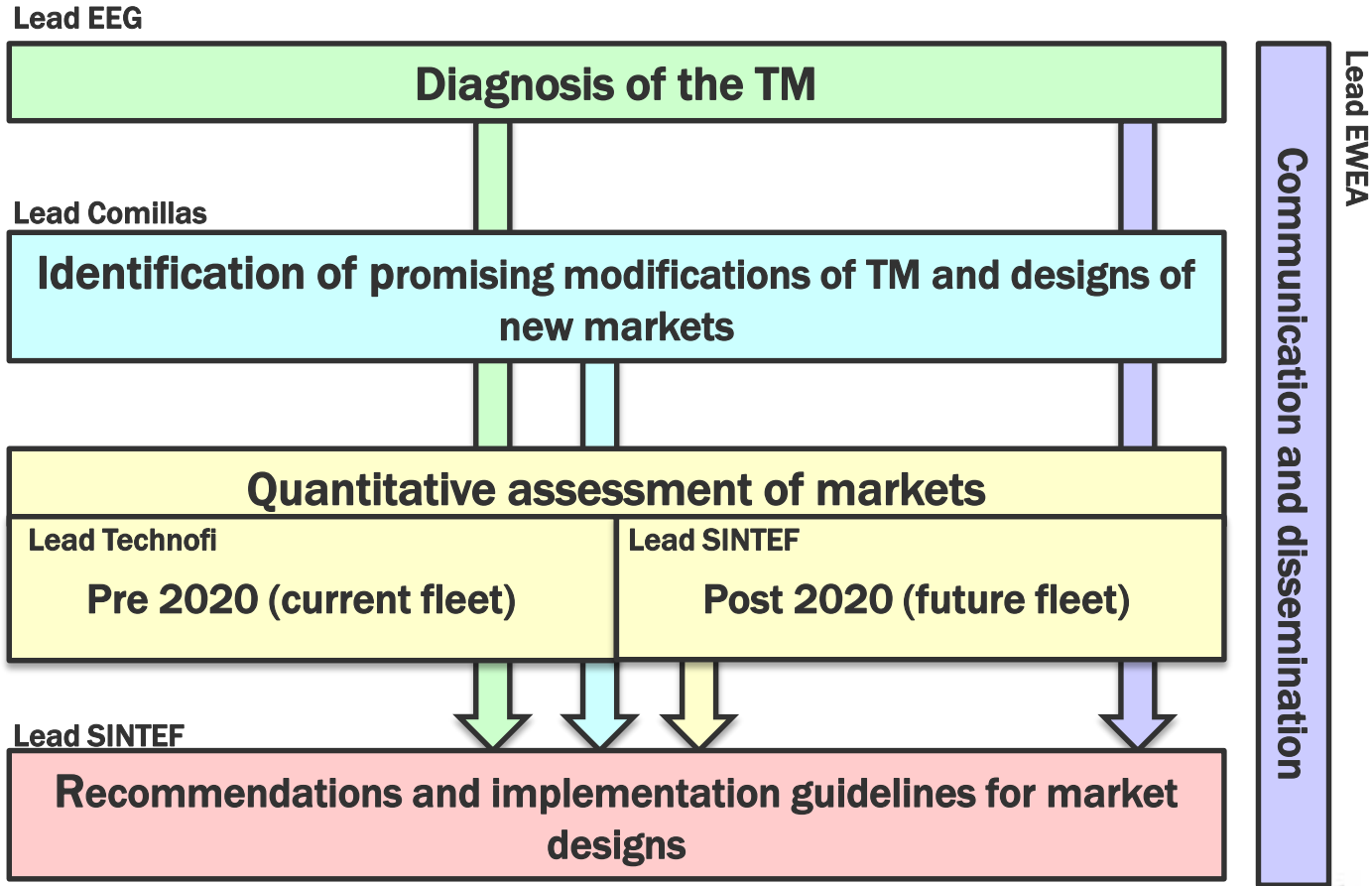
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Project structure





Basis for drafting of main findings

- Deliverables in project
- Feedback received from Advisory Board meetings, Expert Workshops and Stakeholder events, which have been organized in the course of the project
- Iterations on a "main findings" document (ongoing)





(1) Initially, markets were not fit for RES

- ❑ Traditionally, the RES shares in electricity generation were low in many European countries.
- ❑ Thus, the markets were not designed with their specific characteristics in mind (variable, non-controllable output).
- ❑ Focus on day-ahead market
- ❑ Renewables was often curtailed during operation
 - output from RES can be reduced on short notice
 - lack of transparency in operation and curtailment rules

(2) Europe's policy for promoting integration of RES-E technologies has been a success story

☐ Motivation: limit global warming, reduce energy import, ...

☐ RES-E Directives in 2001 and 2009

- Targets for share of renewables
- Priority dispatch for RES
- Feed-in tariffs in many countries

☐ Impact

- Massive investments in renewable electricity.
- 2001 – 2015: Wind-power capacity from 17 to 141 GW.
- 2015: 1/3 of electricity from RES in the EU



(3) This is not the time to stop supporting RES

- ❑ A more ambitious implementation of environmental policy is needed to limit global warming and future mitigation costs.
- ❑ E.g. fewer emission permits
 - higher permit prices, higher costs for fossil-fuel generation, higher electricity prices, profitable RES generation without support
- ❑ However, this is not the situation today.
- ❑ Financial support for RES is still needed to continue the decarbonization of the European energy system




(4) However, it is time to reconsider the design of support schemes

- ❑ Policy instruments (feed-in tariff, priority dispatch) were perfectly fitted in the early phases of liberalization
- ❑ Now, side effects of significant RES penetration are visible
 - volatile (and even negative) prices
 - firm supply having difficulties to recover their costs
 - considerable financial support to renewables



(5) No incentives should be provided when electricity prices are negative

- To avoid start-up costs, thermal power generation may be willing to produce at negative electricity prices.
- With the feed-in tariff, RES production is also incentivized to produce even if price/marginal value is negative.
- Support given per MWh should be set to zero whenever the electricity price is below zero.
- This will improve the functioning of the power system, and reduce (imbalance) costs



(6-1) Design of RES-support mechanisms: Cost-efficiency, risk and use of tenders

- ❑ There is no single design that is best from all perspectives.
- ❑ Capacity auctions (MW)
 - Does not interfere with markets / price signals
 - Excellent short-term efficiency
- ❑ Support based on energy produced (MWh)
 - Provides incentive to increase efficiency and reliability of capacity
 - Favorable long-term impacts
- ❑ Risks and transaction costs
 - Must be considered when assessing the efficiency of a scheme
 - Higher risk, higher interest rate, higher costs (esp. wind/solar power)
 - Auction/tenders (capacity/premium): transparency, standardization



(6-2) Design of RES-support mechanisms: Balancing short- and long-term impacts

- ❑ Fixed price-premium (per MWh) can provide a fair balance between short- vs. long-term impacts

- ❑ If the following conditions are met
 - No support when electricity prices are negative
 - Price-premium is determined through auction/tender,
 - ... which is transparent and standardized
 - Support is based on produced amount, not feed-in to grid
 - In case of floating premium: Must not be affected by day-to-day bidding and outcomes of electricity market (rather long-term trends)

(7-1) Markets for electric energy: Keep up the momentum in harmonization

- ❑ Iterative process to develop network codes (NC) / regulations
 - EC, ACER, ENTSO-E
 - NC for markets: CACM, EB, FCA


- ❑ Considerable achievements have been made in establishing an integrated day-ahead market

- ❑ We also need focus on implementation for intra-day markets



(7-2) Markets for electric energy: Implementation for the **intraday** market

- Market integration is probably simpler than for ancillary services, because of long traditions for TSO control.
- Gate closure in intraday should be close to real time operation so the final position taken before operating can be tuned
- Liquidity must be increased to improve efficiency
 - Access to cross-border transmission capacity is needed to increase set of feasible trades (e.g. through reserving some capacity to intraday)
 - Some intra-day auctions can be combined with continuous trading



(8) RES-friendly environment for electricity balancing is needed

□ Network code for electricity balancing

- Has good intentions with respect to RES
- But much is still left open to be specified in the future

□ Important elements for RES

- Avoid RES curtailment (unless its marginal value is negative)
- Effective imbalance netting between control areas
- Markets for ancillary services should be open for RES generation and demand to the extent they can provide it,
- ... and products should be specified with this in mind

(9) Capacity markets

☐ Several countries have implemented capacity markets, some are in the process of implementation, while others are debating about introducing them.

☐ Our recommendations

- Over-investment though separate national markets should be avoided.
- Allow participation of cross-border interconnection capacity
- Product: financial option with a high strike price
- Amount should be affected by price (to reduce strategic bidding)



(10) Consumers need to be exposed to prices

- ❑ Demand-side flexibility (incl. storages) is an obvious response to RES variability
- ❑ Market mechanisms are set to work if:
 - Consumers are exposed to prices (e.g. day-ahead, intraday),
 - and automatic metering of consumption exist.
- ❑ Participation in markets for real time balancing (MW)
 - Legislation should be open for it, and flexibility products should be developed with this in mind
 - Advanced control is needed
 - Roles must evolve (e.g. aggregators or under system operator's control)

Further process: written communication

Findings and conclusions

- Are based on work carried out in the Market4RES project
- We intend to improve your final recommendations on basis of your feedback (today and in written communication)

Written communication start next week

- Main findings & conclusions document will be sent to stakeholders
- We will ask for written response to market4res@sintef.no
- Feedbacks will be discussed **stakeholder event in Brussels 17th June**

Market4RES deliverables: <http://market4res.eu/results/reports/>