

IEA Bioenergy

Flexibility from bioenergy

Collaborative project



**Kick-off meeting
Feb 27 – Mar 1 2019
Stockholm, Sweden**



IEA Bioenergy, also known as the Technology Collaboration Programme (TCP) for a Programme of Research, Development and Demonstration on Bioenergy, functions within a Framework created by the International Energy Agency (IEA). Views, findings and publications of IEA Bioenergy do not necessarily represent the views or policies of the IEA Secretariat or of its individual Member countries.

Task 44 – Flexible Bioenergy and System Integration

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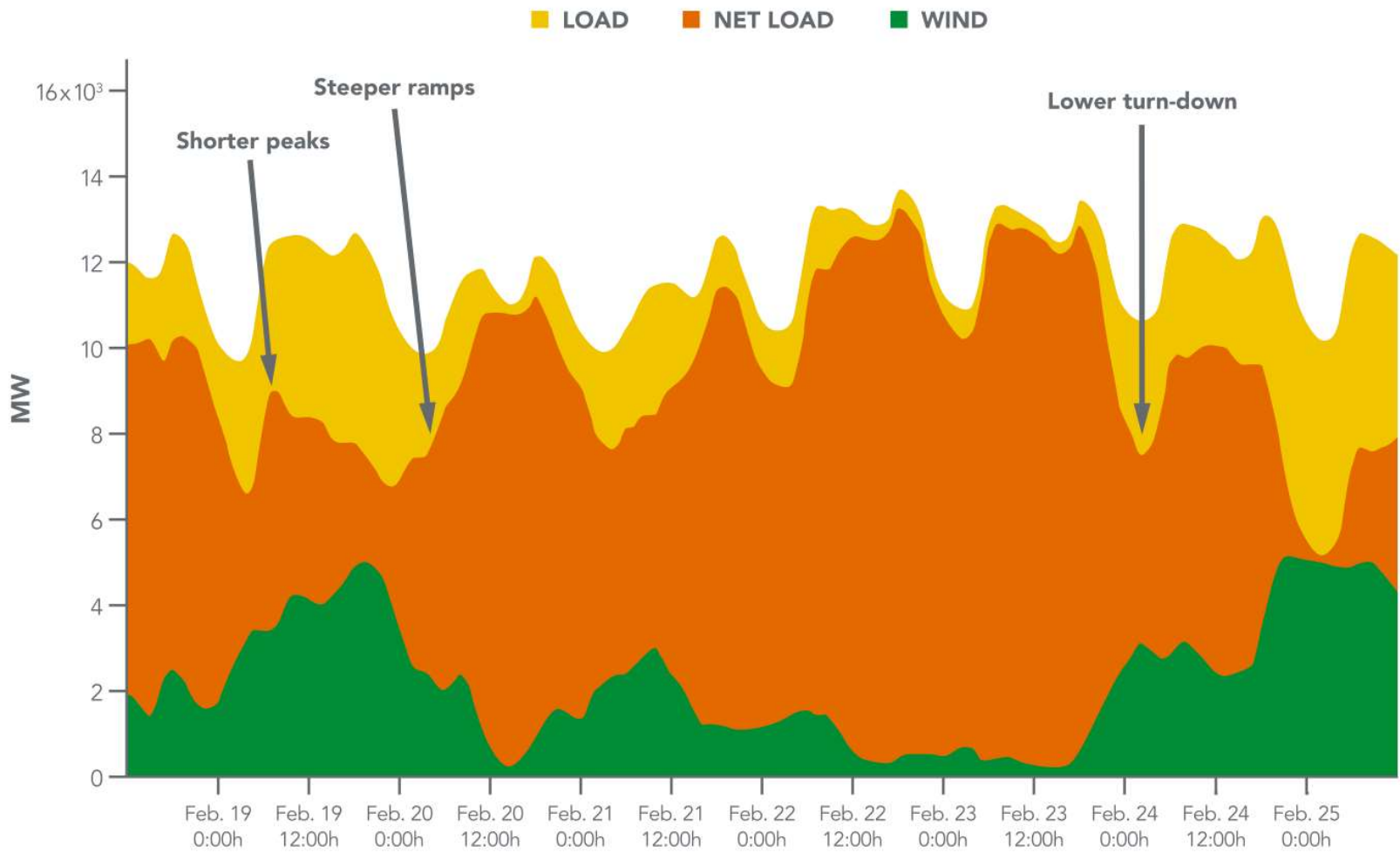
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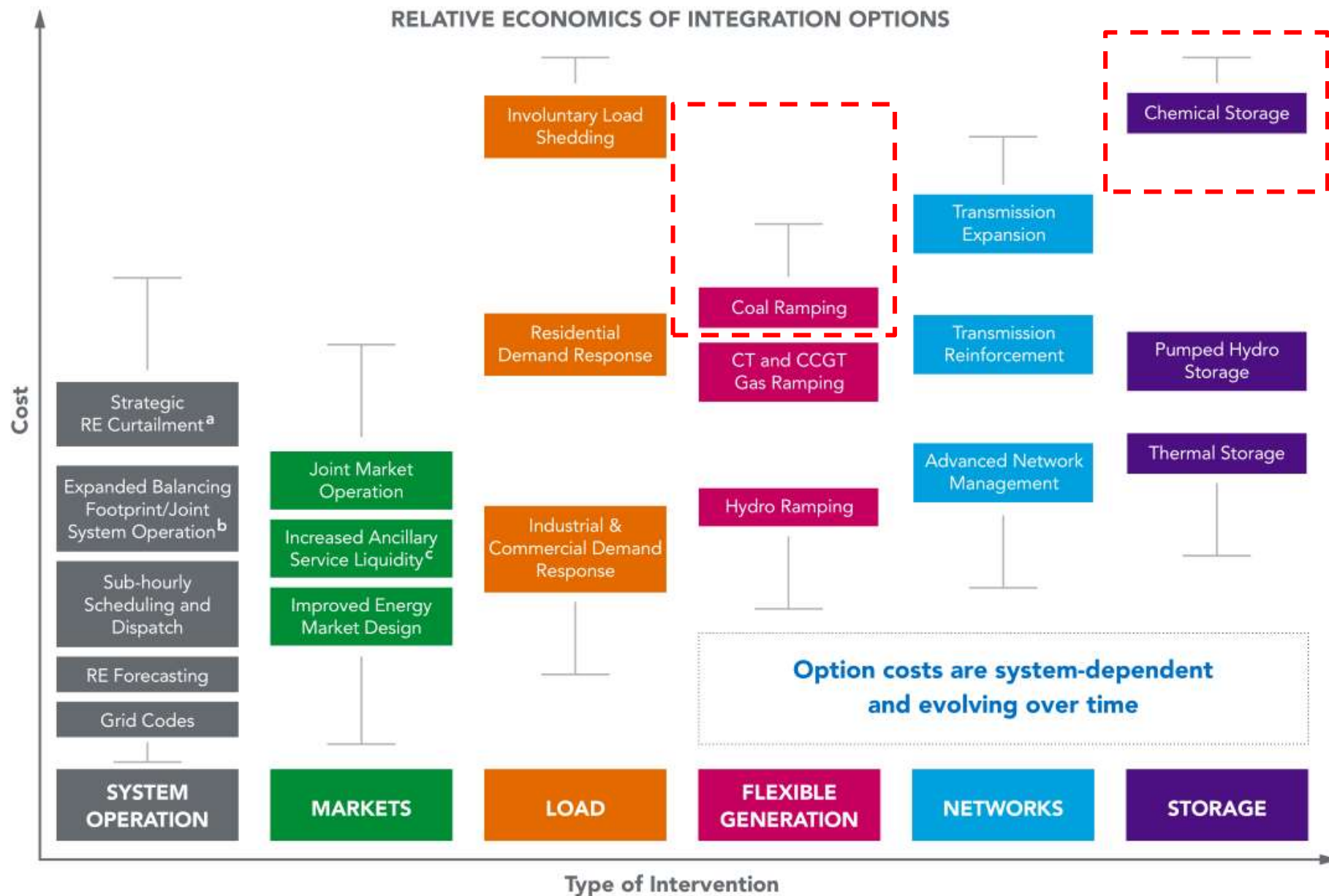
Need for flexibility

- Variability and uncertainty are not new phenomena for an energy system
- All power systems have some inherent level of flexibility to balance supply and demand at all times
- Increasing supply from variable renewable energy
-> greater the need for flexibility
 - Steeper ramps
 - Lower output
 - Shorter peaks



Flexible resources

- Several types of flexible resources exist:
 - Flexible generation,
 - Flexible transmission,
 - Flexible demand-side resources,
 - Flexible system operations
- Flexible system might reduce environmental impact
 - Increased optimisation and efficiency
 - Reduced curtailment from VRE



Source: Flexibility in 21st Century Power Systems

Task 44 Work programme

WP1 - Flexible bioenergy **concepts** for supporting low-carbon energy systems,

WP2 - Acceleration of **implementation**,

WP3 - **System requirements** for bioenergy concepts,

WP4 - Intertask projects and **collaborative** projects.

Process flexibilisation

- Pyrolysis based
flexibilisation
FIN
- Automation of boilers
FIN
- Flex CHP gasification
FIN
- flexible
small scale combustion
and gasification
DE
- biogas process
development
+ storage
SE+DE
- SN to (and other gasified
products)
CH+NL+AU+IRE
- Renewable G
(Biomethane)
IRE
- Gasification combined
with SOFC for general
heat, cool & power
AU

Integration concepts

- Increase yields of biogas
by combination with
Electricity
FIN
- Combination
FT and other RE
based on biomass and power
CH + AU + FIN
- biogas combination
with other RE
(i.e. in small CHPs)
CH + DE
- biogas and surplus
power H₂
CH + IRE + DE
- Substituting biomass
with Biomethane + power
in the heating sector
IRE
- biogas "to start"
(from AD, waste...)
with dispatchable energy
(PV)
AU
- CHP (biomass)
with other fuels
and for different
demand
SE
- Concepts for local
production in micro
grids (with PV, heat, power
storage...)
AU
- Combination of Biomethane
+ SN G + H₂ + PV G in the
Energy System Integration Plant
(CH)

Market integration

- Wanted:
Identification of
barriers
AU
- bioenergy for
energy security
(also liquid fuels?)
AU
- Weather related integration
of biomass with other
Renewables
CF
- Coupling the
electricity + gas grid
NL
- Value of flexible biogas
DE
- many different-
technology providers
(biomass, PV, ...)
AU
- FIN: both manufacturers
gas grid operators
gas network
CH +
IOC
- Consultants, direct markets
plant constructors
DE
- Ethanol producers
AU

techno-economic
-policy for BF

Modeling
environmental effects
DE

Flexibility also for
the feedstock base
(bioeconomy)
NL

Seasonal topic!
in many countries...

System modelling

- Modelling system
integration of biogas
NL + DE
- Integrated system
modelling
ETSAP
NL + IRE
- BECCS modelling
IRE
- GHG emission reduction
costs for the heat
sector
AU
- To Do:
Better
understanding
of wind, solar... Top

data stall =



Project set-up

- **Activity 1: Overview of flexible bioenergy technologies and solutions** (mainly involvement of energy technology-related tasks)
- **Activity 2: Roadmap for flexible bioenergy and system integration of renewables** (mainly involvement of energy system-related tasks)
- **Activity 3: Webinar presenting the roadmap**