Prosumer (trough an App?)	Flexibility device$_i$	BRP Forecasting tool	Balance scheduling	FO	DSO DMS	SCADA	

Preparation operations

- Consumption/generation forecasting
- Grid metered values
- **Unbalance prediction**
- **Grid congestion detection**
- Flex. request
- Flex. request / Capacity limit
- **Flex. priorization**
- Special request/ restriction??
- Metered/status values
- **Flex. availabilty check/Inputs update**

Plan operations

- Flex. request accepted (price;quantity)
- **Flex. plan**
- Flex. request accepted (price;quantity)
- Flex. plan
- Acceptance??
- **Replan (if needed)**
- Acceptance??
- Acceptance??

Execute

- Control signals$_i$

Settlement

- Metered values$_i$ Flexibility activated$_i$
- **Flex. calculation**
- **Settlement**
- Delivery note
- Delivery note
- Delivery note
- Delivery note
- Acceptance??
- Acceptance??
- Acceptance??
- Billing (payments; penalizations)
- Billing (payments; penalizations)
- Billing (payments; penalizations)
- Billing (payments; penalizations)
- Billing (payments; penalizations)

Diagram 1 (top):

ESTABANELL SCADA | INVADE IIP | SITEL PF | DSO | OFPF

- Load forecast → ESTABANELL SCADA
- Grid status (.txt) → SITEL PF
- Power Flow
- results → DSO
- Grid topology → SITEL PF
- OFPF
- Flexibility requests → INVADE IIP
- Flexibility services
- Flexibility offers → DSO
- Replan (if needed)
- Acceptance
- Control signals$_i$ → DSO

Diagram 2 (bottom):

DSO: SCADA | SITEL PF | Flexibility Management System (FMS) | OFPF
FO: INVADE IIP

- Load forecast → SCADA
- Grid status (.txt) → SITEL PF
- Grid topology → SITEL PF
- Power Flow
- results → OFPF
- OFPF
- Flexibility requests → FMS
- Flexibility requests → INVADE IIP
- Flexibility services
- Flexibility offers → FMS
- Replan (if needed)
- Acceptance
- Control signals$_i$ → FMS

DSO

SCADA | Power Flow | Flexibility Management System (FMS) | OFPF algorithm

FO

INVADE IIP

Load forecast

Grid topology (.xlsx)

Power Flow *(t)*

PF results (.json) → PF results (.json)

Congestion detected?

No ← No

Yes

OFPF

Flexibility requests

Flexibility requests

Flexibility services

Flexibility offers

Acceptance

Replan (if needed)

Load forecast

Grid status (.txt)

Control signals$_i$

Grid topology

Power Flow *(t+1)*

(…) → (…)

(…)

(…) ← (…)

(…)

Grid   SS

Grid

HV/MV

MV/LV

$\varphi_{1,t}^{ACT}$
$\varphi_{1,t}^{REA}$

CES

$P_{1,t}$
$Q_{1,t}$

$P_{2,t}$
$Q_{2,t}$

...
...

$P_{K,t}$
$Q_{K,t}$