

WE GIVE YOU ENERGY

PANNON GREEN POWER

PV assets balancing cost and drivers in Hungary and
State of the Art methods to minimize them





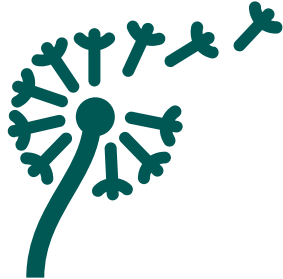
LEADING PV DEVELOPER AND SERVICE PROVIDER IN HUNGARY

PRESENT MARKET AFTER CEP IMPLEMENTATION

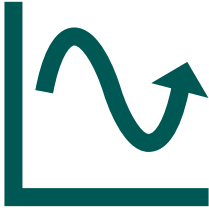


KÁT Producer	TSO+HUPIX	DA/ID	2.5	1763 MW PV+others	Consolidation
METÁR producer	Market player + several tools	ID based	1	Negligible PV+others	Bankability

CONSOLIDATION AND QUESTIONS



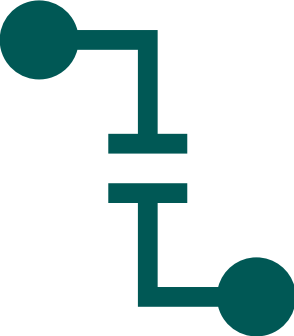
Producers in portfolios
Consolidation between schedulers



Still high balancing costs
Seasonal effects and industry drivers

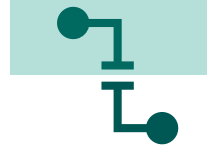
CONSOLIDATION AND QUESTIONS

Technology enablers



Market enablers

TECHNOLOGY AND PROCESSES – CONTIOUS IMPROVEMENT



1.0 Daily images



Silo models



Passive inverter monitoring



Excel, manual uploads

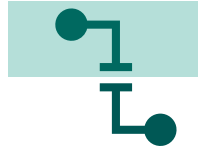
2.0 Hourly or more frequent data

AI integration

Active Asset Management

Latest API and process controls

MACHINE BASED APPROACH



Generation



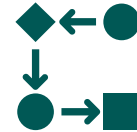
Access



Feedback



Process controls



1.0

Excel based

Browser based

Browser based, manual

Ad-hoc decisions

2.0

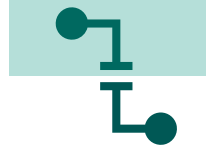
Machine generated

Web service

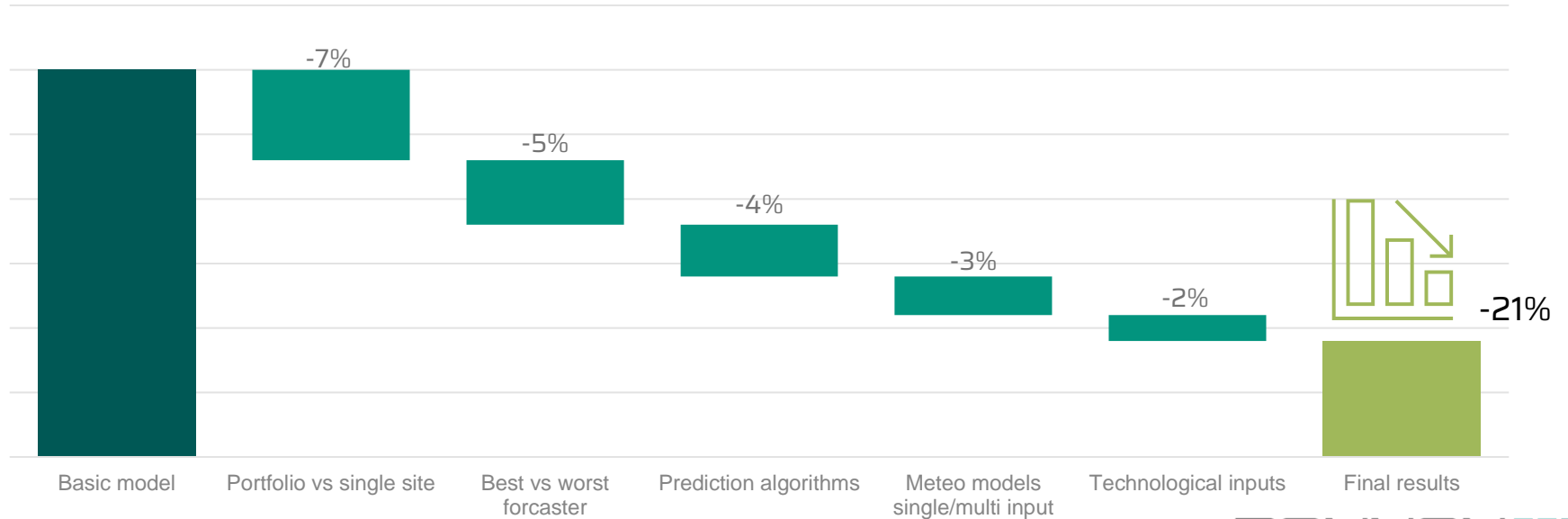
Statistics, alarms

Machine generated weekly, daily, hourly alarms

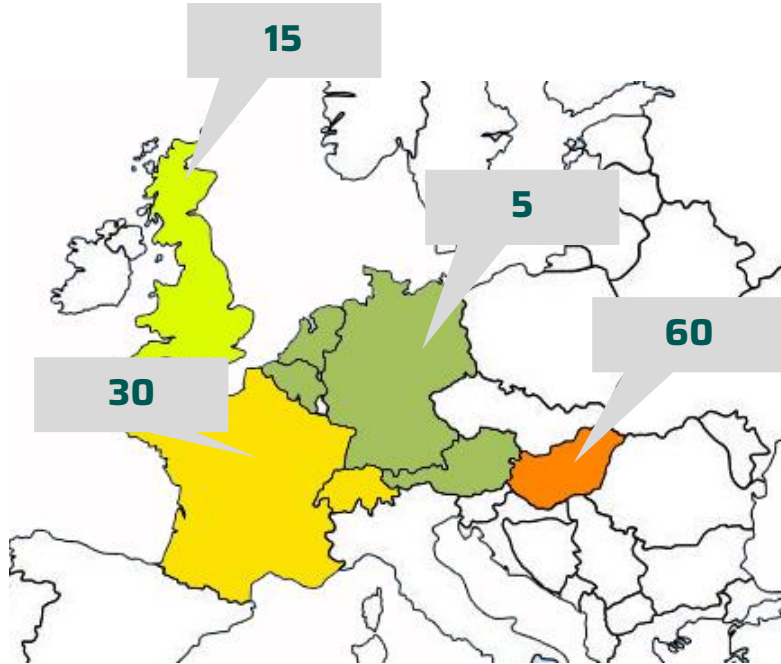
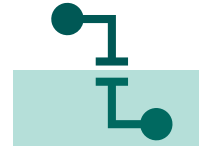
BASIC VS IMPROVED SCHEDULING



rMAE reduction factors

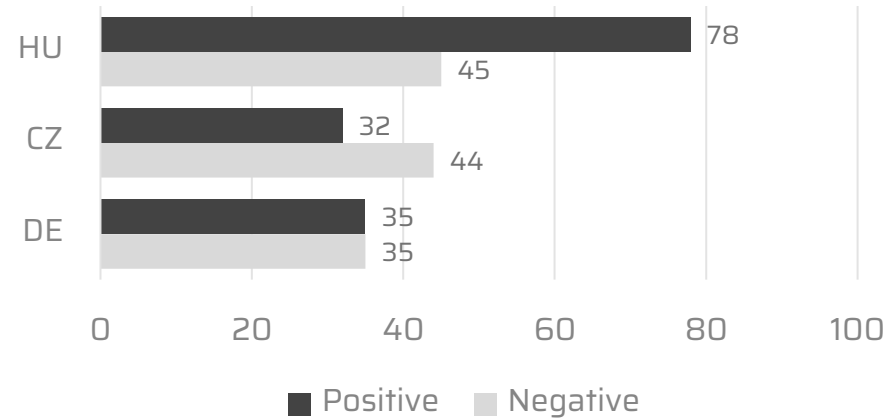


BALANCING FEE AND LEAD TIMES: D, CZ, H



ID Lead times (minutes)

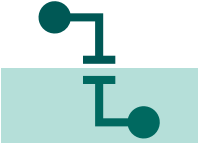
Balancing price 2019-2020, EUR/MWh



ID/DA = 4.5% HU

ID/DA = 18.33 D

REGULATORY ENABLERS AND OPPORTUNITIES

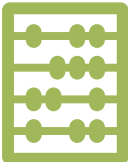


Balancing fee formula

Picasso

New TSO reserves

Lead times



1.0

Supports financial scheduling

Country based aFRR reserves

Traditional PPs

1 hour

2.0

Supports technical schedules (rMAE)

Market coupling

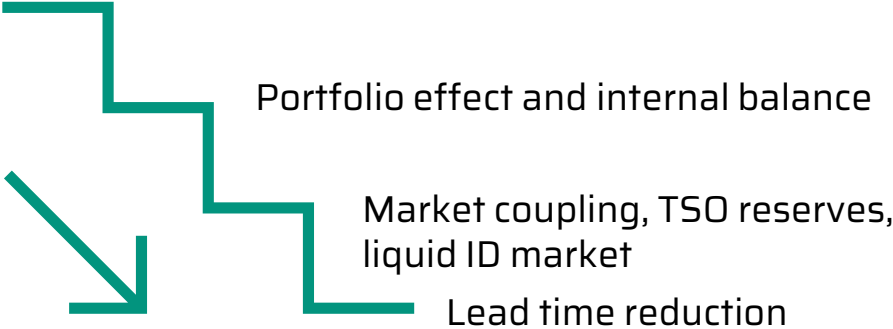
Renewables in new roles

5 minute

TOMORROW NEVER DIES

7-10 EUR/MWh

Technology improvement



2-3 EUR/MWh

THANK YOU

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