Status of Continental European system

EXTENSION PROJECTS

Is there room for more?

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“Eastern Partnership Platform on energy security”, Brussels

11th December 2015

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Principles

Maghreb, Burstyn

Albania, Turkey, Kosovo*

Ukraine/Moldova?

Baltic countries?

Principles: two types of system extensions

Terms of References of Regional Group Continental Europe (CE)

- Article 7
  - System extension type A
    - geographic extension of a control area which is part of the synchronous area CE; The extension can contain only loads (passive island), only generation or both loads and generation
  - System extension type B
    - synchronous interconnection between a control area which is part of the synchronous area CE and a control area which is not yet part of the Synchronous Area Continental Europe

Comparison of system extensions

Type A

Geographical extensions:

Spain expanded towards

- Maghreb (Morocco, Algeria, and Tunisia)

Poland expanded towards

- Part of Ukraine (Burshtyn island)

Type B

Interconnections with:

- Turkey
- Ukraine/Moldova?
- Baltic states?

By analogy – interconnections with:

Albania, Kosovo*

Comparison of requirements

Type A

The control area which has a geographical extension is:

- Responsible that the system operation of the control area + the geographical extension is compliant with the technical operational standards
- But not responsible for the operation of the geographical extension itself

Type B

The control area which joined the CE system is:

- Responsible to be compliant with the full scope of CE technical operational standards (e.g. Turkey, Albania, Kosovo*, and in the future possibly Ukraine/Moldova, Baltic states)

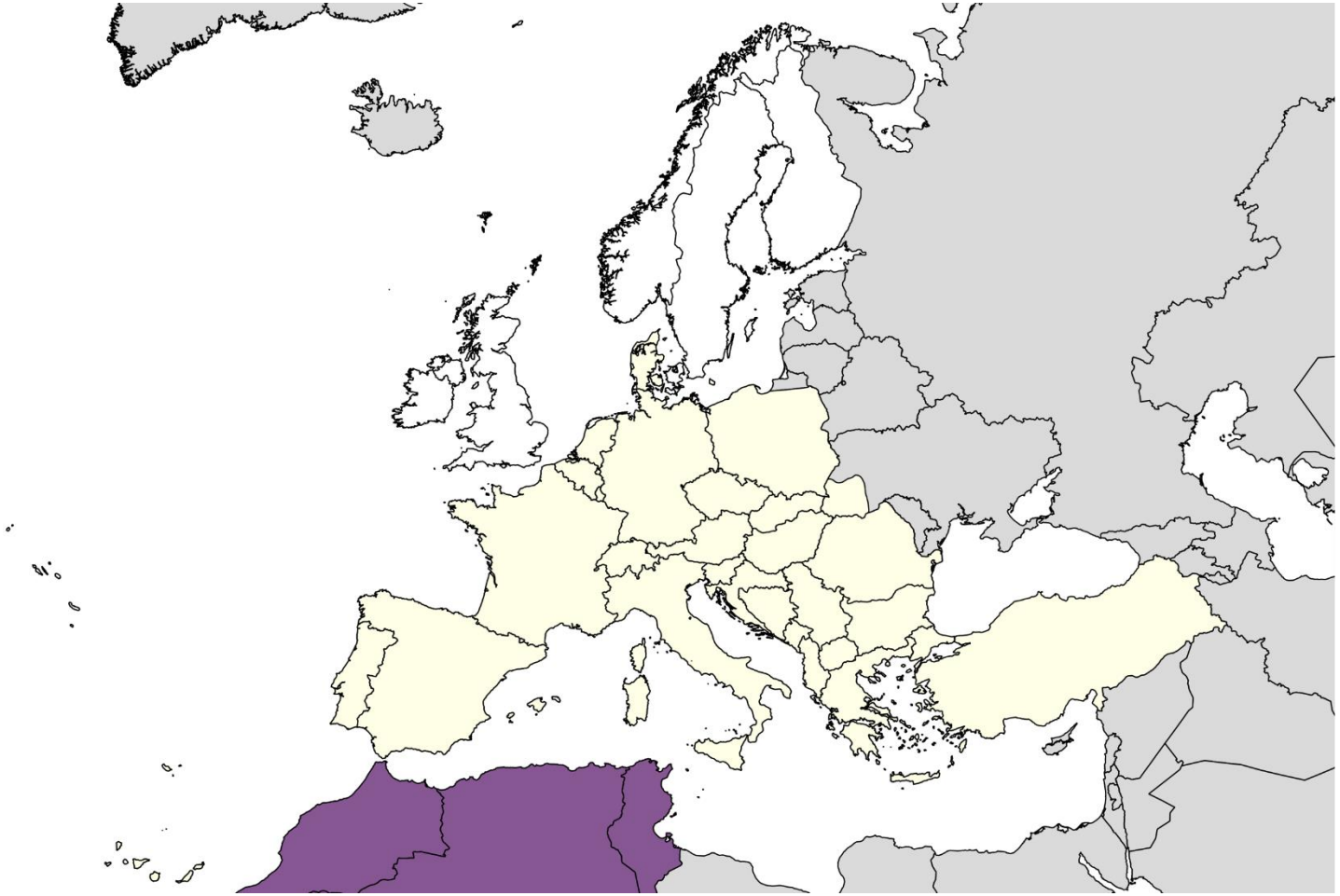
Maghreb

1998, first cable

2006, second cable

Extension type A

Extension of the Spanish control area



Burshtyn island in Ukraine

2002

Part of Ukraine added to the Continental European system

Extension type A

Extension of the Polish control area

Albania

Synchronously connected since 1986

Albania asked to become UCTE member in 2004

Extension type B by analogy

Albania fulfilled the technical compliance criteria in 2014

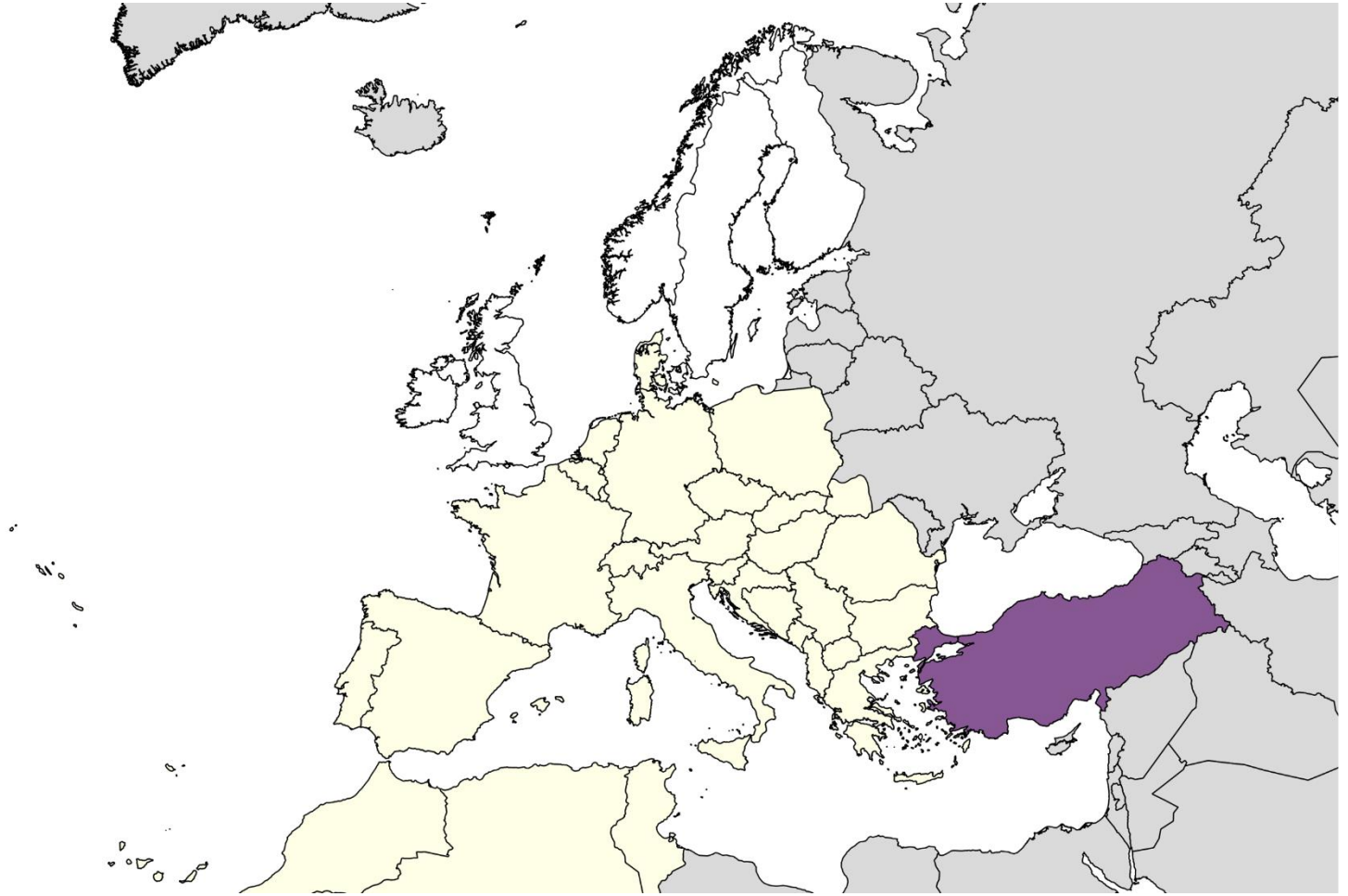
Turkey

Turkey applied for synchronous interconnection in 2000

Full range of tests (island operation, trial operation)

Extension type B

Turkey fulfilled the technical compliance criteria in 2014



Kosovo*

Synchronously connected already in times of Yugoslavia

EMS (Serbia)/ KOSTT (Kosovo*) agreement in 2014

Extension type B by analogy

ENTSO-E Project Group supports KOSTT to reach technical compliance

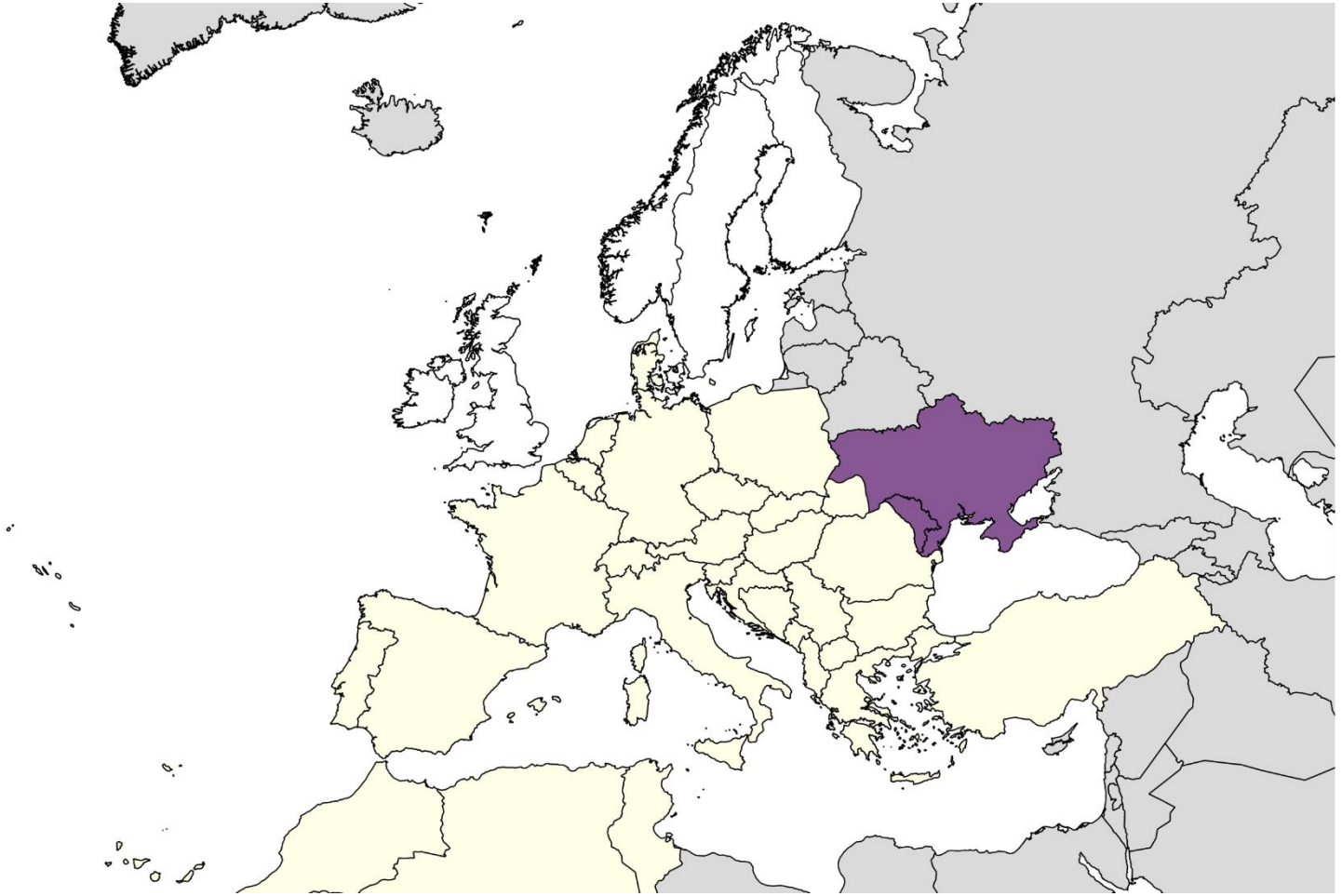
Ukraine/Moldova ?

Feasibility study practically finished (end 2015)

UA/MD TSOs need yet to ask for synchronous interconnection (2016?)

Extension type B

Regional Group CE will assess the feasibility; if positive, a catalogue of measures will be set-up



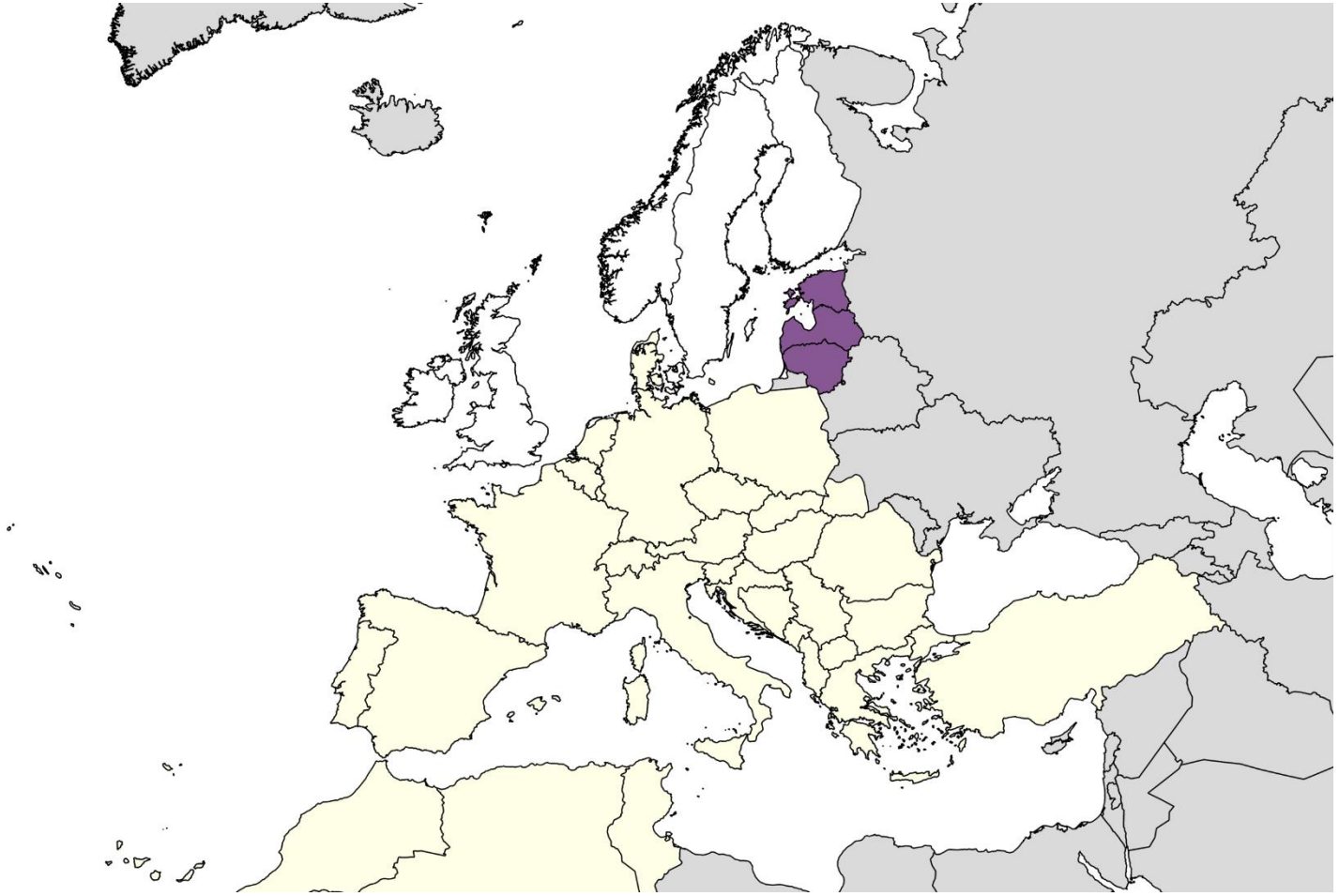
Baltic states (Lithuania, Latvia, Estonia) ?

Feasibility study finished end 2013

Baltic TSOs need yet to ask for synchronous interconnection (>2020)

Extension type B

Regional Group CE will assess the feasibility; if positive, a catalogue of measures will be set-up



More or less room for AC? Or rather DC?

- ENTSO-E recommends, in principle, HVDC interconnection
  - „If an AC connection is requested, then a technical study must be carried out to prove its feasibility, demonstrate that such an AC connection is not increasing the risk for the synchronous area, and show the benefits, in terms of security of supply, for the connecting party of using an AC connection compared to a HVDC connection.“ (Draft ENTSO-E recommendations on relations with 3rd country TSOs)
- The critical point for Ukraine/Moldova and Baltic TSOs is, therefore, the feasibility and benefit assessment of the AC interconnection
  - In principle, almost everything is technically feasible ☺
  - However, we know nothing about hugely extended synchronous systems; the complexity and risks may increase
  - ENTSO-E will probably ask the candidates to demonstrate also the benefit

Thank you for your attention

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