

Testing of "Start-up from darkness"

Passing the voltage through the lines of VSD, a.s. to power station TEKO, a.s.



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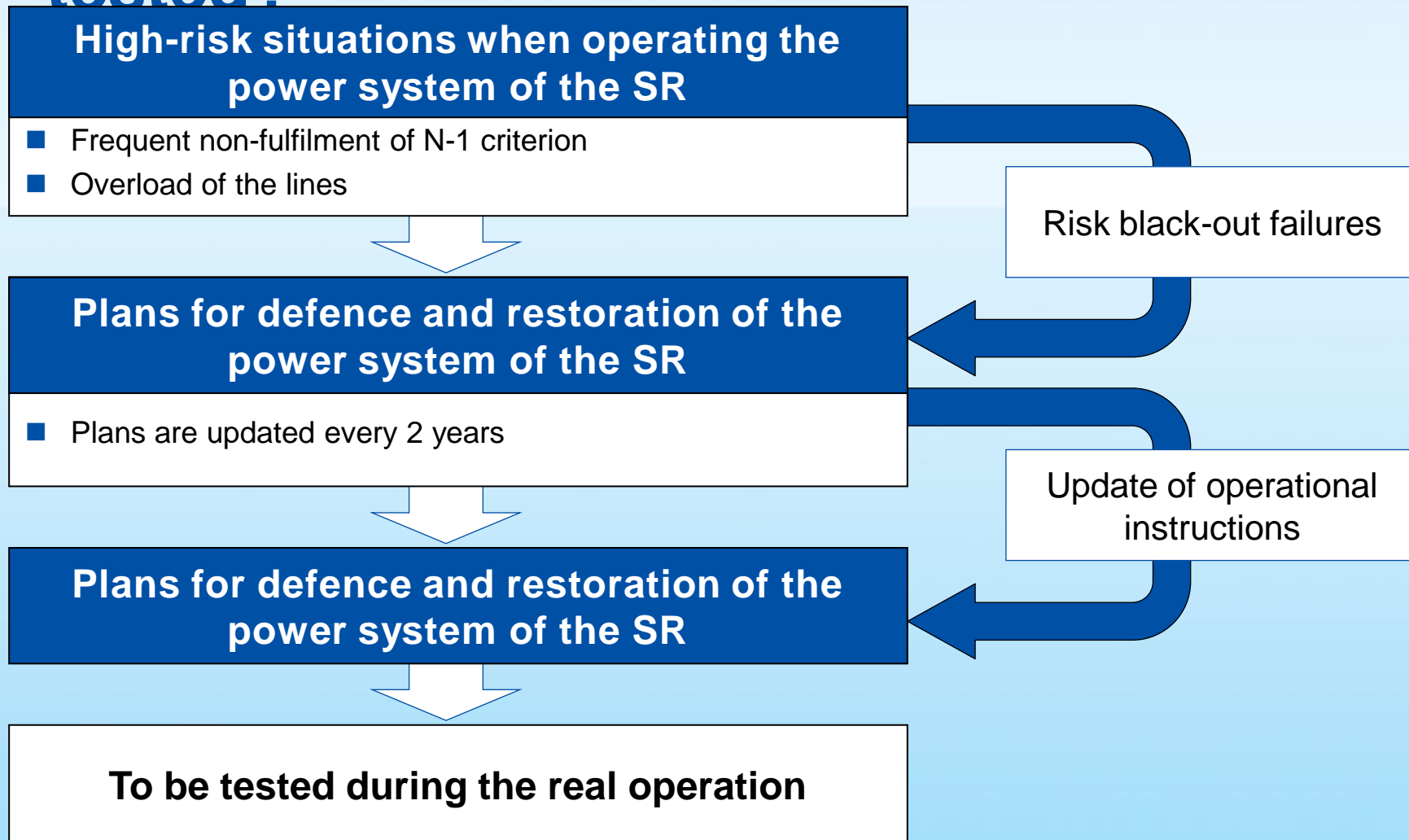
ENKO 2014, Bratislava

What is the “Start-up from darkness“?

“Start-up from darkness“ is a support service of local character.

- It is a decisive process of the power system restoration after a failure of the black-out type.
- It is a start-up of the electricity-generating installations (system power station) and delivery of electricity to the power system without using the voltage of the system.
- “Start-up from darkness“ is also possible during the operation of the system. Testing is carried out by passing the voltage from the power station providing the service of the start-up from darkness through the lines of the transmission or distribution system in the direction of the route to the system power station.

Why is „Start-up from darkness“ tested?



Why is "Start-up from darkness" tested?

Last time, „Start-up from darkness“ was tested in 1997

What has happened since then:

- Changes in legislation
 - Liberalization of electricity markets – changes in the electricity market rules
 - Separation of transmission from distribution and generation
- Automation of the power system elements in the SR – new technologies
- Massive commissioning of renewable energy sources
- Generational change in control operators

Objectives of the “Start-up from darkness“ testing

To verify organizational readiness

- Ability to build a route for passing the voltage
- Activity after a failure of the black-out type (Restoration plan)
- Response time and readiness of the control room staff

To verify technical readiness

- Availability and dynamic stability of the power stations: HPS Ružín and DG-energy Moldava
- Ability of the ES operation for own consumption
- Behaviour of the island during a change in load
- Satellite communication between control room operators
- Remote control for a failure of the black-out type

Process of the "Start-up from darkness" testing

Plan of testings	<ul style="list-style-type: none">■ Date of testing 18 June 2014■ Route No.1 – Start-up from HPS Ružín 08:00 am■ Route No.2 – Start-up from DG-energy 01:00 pm
Organization and management of testings	<ul style="list-style-type: none">■ Management of testing: SEPS / SED■ Sources for „Start-up from darkness“: SE / HPS Ružín and DG-energy■ Routing for passing the voltage: VSD■ System power station: TEKO
Communication between control room operators during testing	<ul style="list-style-type: none">■ Telephone communication will be created and managed by the central control room SED Žilina■ It will be permanent via conference call■ Should it fail , the satellite phones will be used instead

Routes of passing the voltage

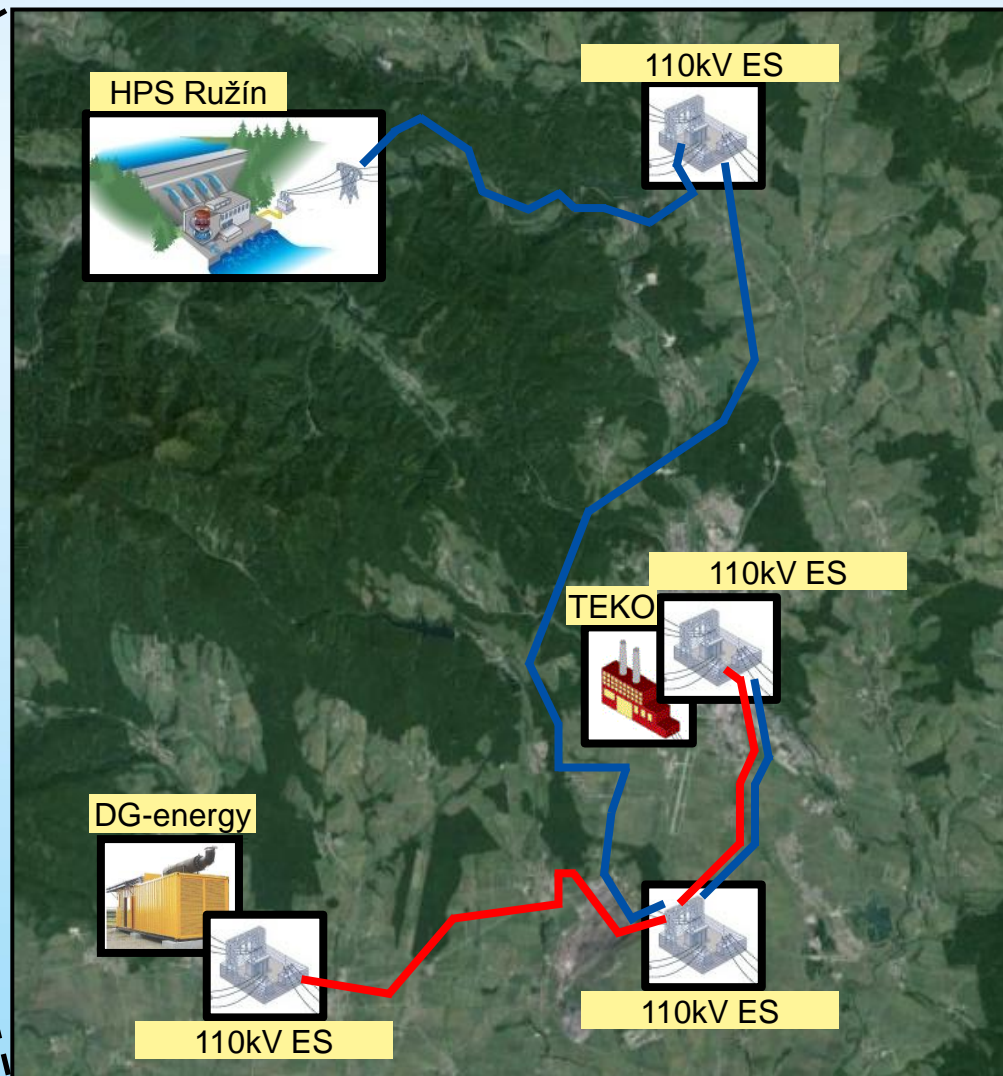


Route No.1

HPS Ružín - TEKO

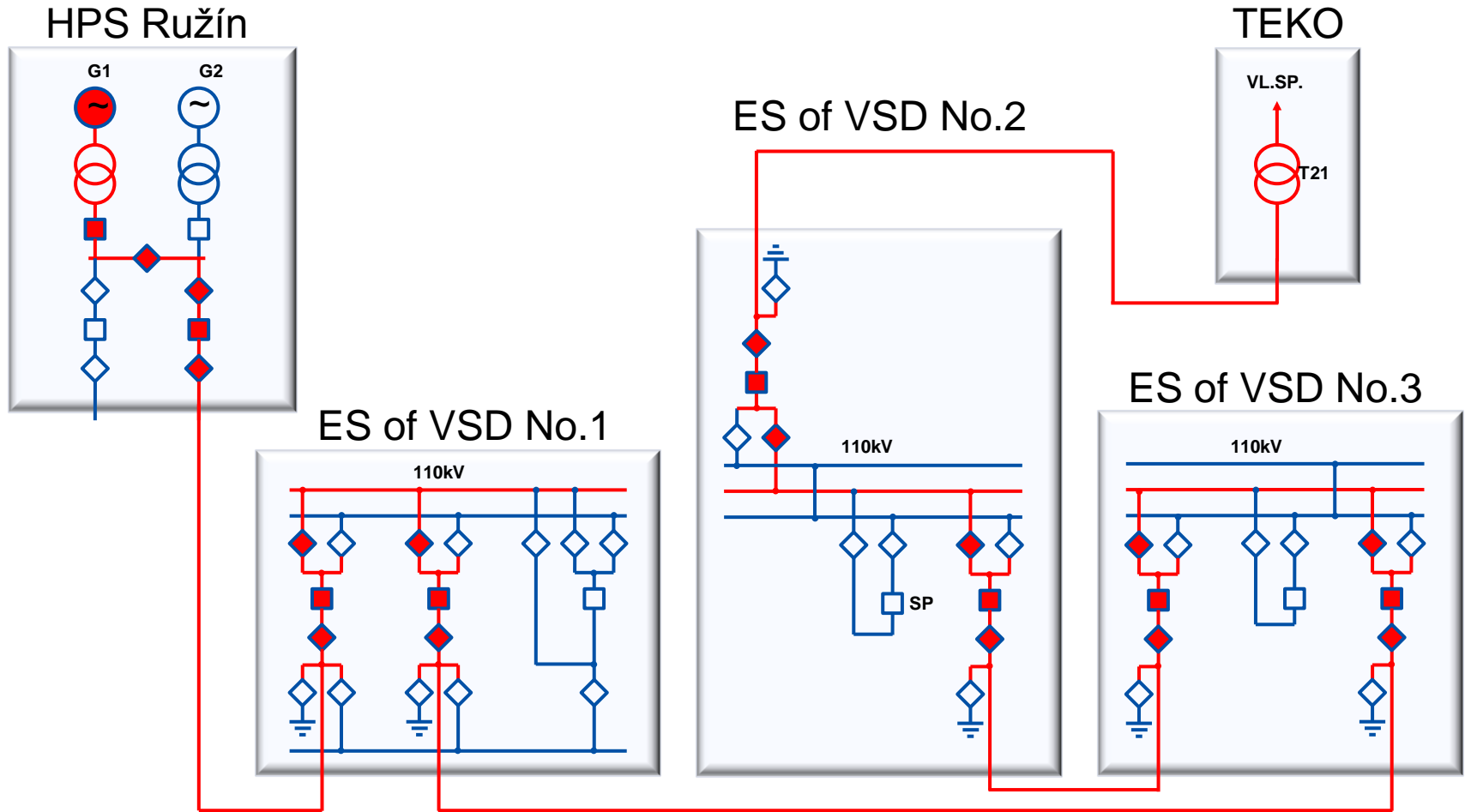
Route No.2

DG-energy - TEKO



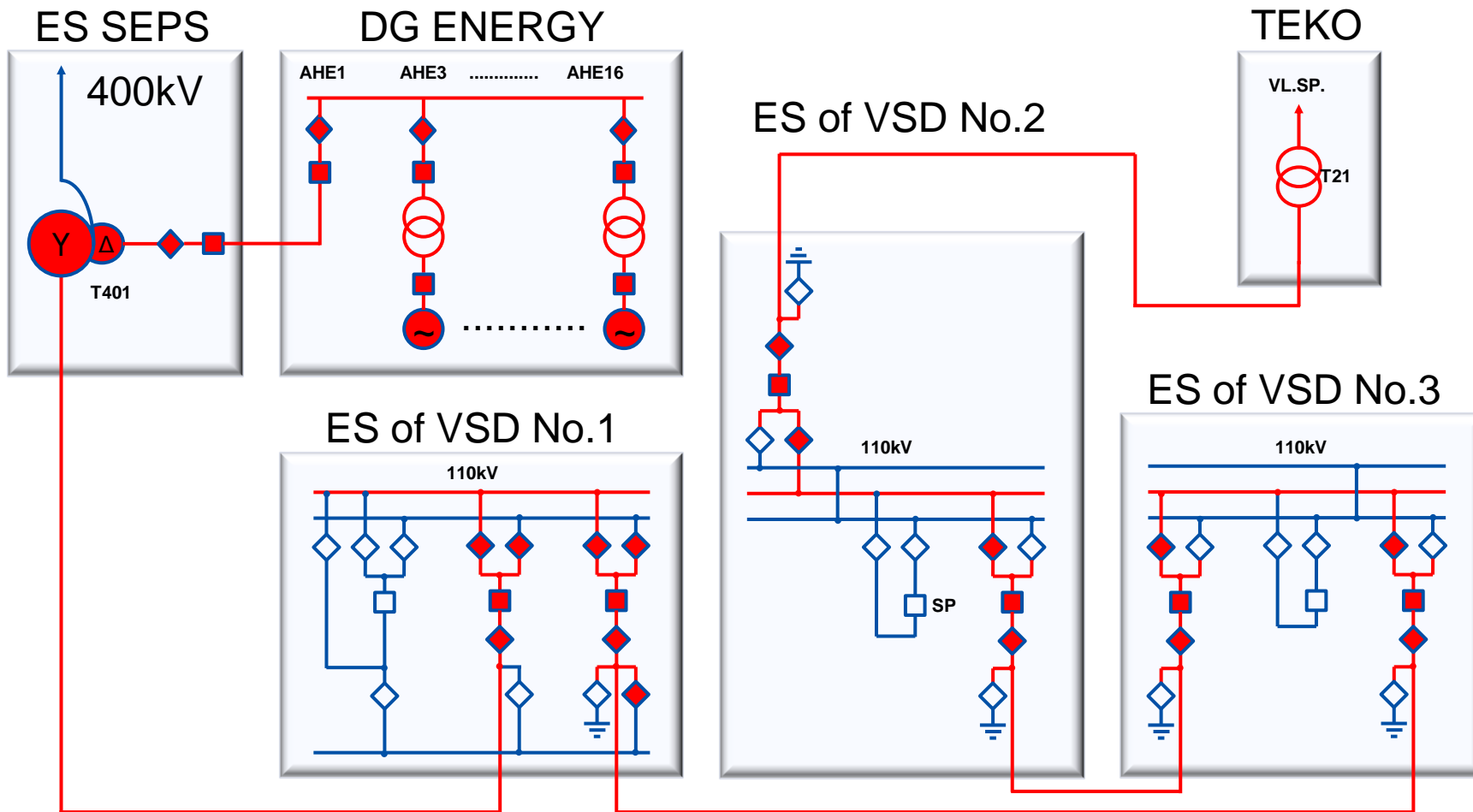
Routes of passing the voltage

Route No. 1 – Start-up from HPS Ružín



Routes of passing the voltage

Route No. 2- Start-up from DG-energy Moldava



Testing process

1. Loss of the feeding for own consumption (only in Ružín)
2. Start-up of the installations („Start-up from darkness“)
3. Passing the voltage to the distribution system
4. Establishing the route for passing the voltage
5. Connection of own consumption to TEKO
6. Elimination of feeding TEKO own consumption from reserve sources
7. Connecting the load for a predefined period of time
8. Load disconnection

Testing conditions

1. Minimized activities in the TS, DS and power stations
2. Log-out of availability and supply of PpS in Ružín and DG-energy
3. Sufficient level of the upper reservoir of pumped storage unit Ružín
4. Sufficient fuel supply in the tank of DG-energy
5. 110kV ES in the route of passing the voltage in the basic connection
6. 110kV bus bars available at the ES in the route of passing the voltage
7. Presence of stand-by duty employees at ES
8. Identical schemes for all participants of the “Start-up from darkness”

Conclusions regarding the planned testing

Restrictions to the planned testing

- Impossible to start-up the electric generators of the TEKO system power station
- Impossible to test behaviour of the island operation stations and connection of the island to the power system of the SR

Benefits of the planned testing

- It enables to prepare the central control room operators for real crisis situations
- The knowledge gained will be used for trainings, trainings simulators, MPP, PI, technology and process adjustments
- It enables to verify the results of calculations in the model situations

Thank you for your attention

