PROPOSED
NRS 048-9 Ed.3: 2023

National Code of Practice:
Emergency Load Reduction
and System Restoration Practices

(*prepared by the NRS 048-9 Working Group*)

Presentation to NEDLAC

Presented by

Vally PADAYACHEE, ***CD (SA), MBA, MSc (Eng), GCC, EDP (Wits)***

Chairman, NRS Association Management Committee

NRS Association of SA

NRS048-9 - Purpose

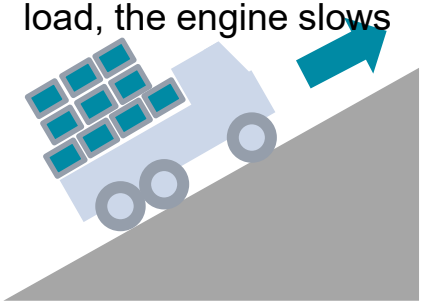
How does NRS048-9 fit into existing accountabilities

- NCC (National Control Centre) has the responsibility and the authority to intervene in the network in any way necessary including actively disconnecting sections of the national grid.
- NRS048-9 in no way subrogates this authority.
- NRS048-9 provides:
  - a structured way for utilities responding to NCC's instruction to reduce load, allowing them to control how load is reduced, should they use the option.
  - limits and suggestions on ways of managing critical and essential loads.
  - Communication and notification obligations to the public.
- NRS048-9 has no authority to designate special sectors.

Why load shedding ?

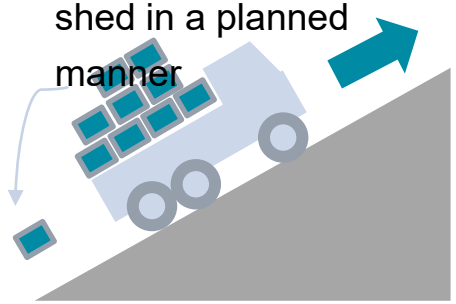
A *controlled intervention* to *prevent a blackout,* using protocols *designed around safety*.

1. If the engine capacity is too small for the truck's load, the engine slows



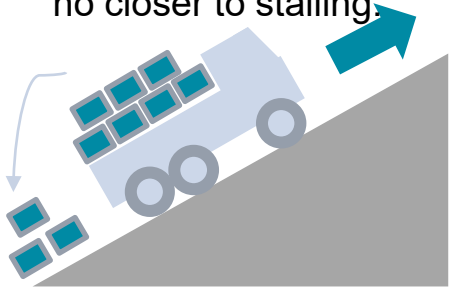
If generation can't meet demand, generators slow down and trip (cascading)

2. To prevent the engine from stalling, load is shed in a planned manner



Eskom proactively implements *controlled manual load shedding*, 8 scheduled stages (1000-8000MW)

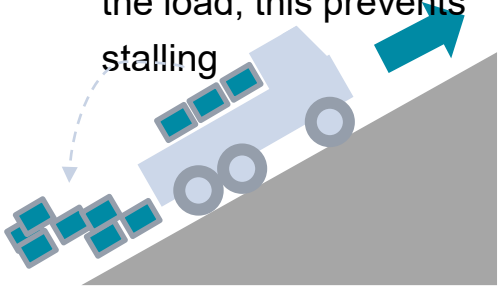
3. Business suffers, but the truck moves and the engine is no closer to stalling.



The system is no closer to a national blackout, even if we need further *unscheduled shedding*

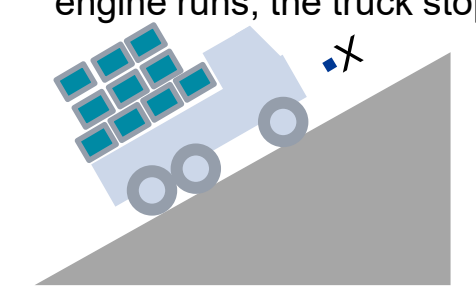
- What if we don't get controlled load shedding right, or things happen too quickly?

1. Automatic mechanisms can shed up to 50% of the load, this prevents stalling



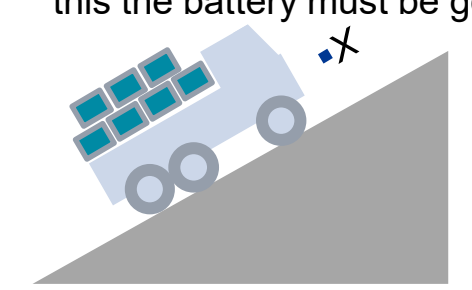
A blackout is averted by the automatic protection scheme, multiple automatic layers.

2. If this all fails, the "clutch" automatically disengages, the engine runs, the truck stops



A blackout occurs, some generators *island*, it takes days to restore electricity

3. If the engine stalls, we need to use the starter motor – for this the battery must be good.



A *full black start* is required, it can take 2 weeks to restore most electricity supplies

NRS048-9 - Legal Constraints

Legal limitations to maintain licensee status

- NRS048-9 Edition 2 has been made a licensee requirement by NERSA, partly because it complies with existing legal constraints.
- Edition 3 must comply with these constraints, or it will not replace Edition 2.
- Electricity Regulation Act (ERA) “equity” clauses:
- Electricity Act- Powers and duties of licensee:
  - (2) A licensee may not discriminate between customers or classes of customers regarding access, tariffs, prices and conditions of service, except for objectively justifiable and identifiable differences approved by the Regulator.
  - (3) A transmission or distribution licensee must, to the extent provided for in the licence, provide non-discriminatory access to the transmission and distribution power systems to third parties.
- Additionally, the ERA makes provision for special conditions and decisions when a disaster has been declared.

NRS048-9- Edition 3 process

Stages 1, 2, & 3 (NOTIFIED)

- Over 100 comments were received from stakeholders asking for various changes to Edition 3.
- These were assigned to 8 subject specific task teams and were debated within those teams.
- Unfortunately most of the comments could not be accommodated because:
  - They contradicted the equity principles as currently laid out in law- to accommodate them will require a change to the ERA and Grid Code.
  - The inability to predict with sufficient accuracy the need for loadshedding- this is unlikely to change until the nature of the supply side of the ESI changes.
  - The lack of smart technology that exists within the ESI grids and network- smart metering, of the right types with the right capabilities would allow for much finer control of the network, allowing for exclusion of critical loads, individual curtailment vs loadshedding decisions of network neighbours etc.

NRS048-9- loadshedding

What are the changes to loadshedding?

- Increased to 16 Stages from 8 Stages- the whole base load.
- Removal of non 16 block or 2-hour options.
- Removal of contingency sections.
- Explicit instructions for utilities to keep lists of their exempted loads.
- Allowing municipalities to use the gap between 5% and 6.25% for critical loads that benefit all customers, while allowing NERSA to audit and possibly undo this if inequity is discovered.
- More specific instructions on how loadshedding is done to help SO protect the system and frequency:
    - Specifying that single blocks must be shed and returned in turn.
    - Allowing SO to dictate changes to odd or even hour shedding to balance the load.
    - Allowing NCC to intervene in the real time shedding of utilities to improve frequency control.

NRS048-9- loadshedding

The motivation to change loadshedding requirements

- Increased to 16 Stages from 8 Stages & removal of contingency sections:
  - Use of Stage 6 prompted SO to ask about extending the stages to manage possible shedding above Stage 8.
  - In Edition 1 , with stages capped at Stage 4, asking utilities to " find" load under emergency conditions, with 3/4s of the load not being used was reasonable.
  - In Stage 8 half the load is shed and the other half is waiting to be shed-much harder to "find" load under emergencies. Edition 3 provides a method for utilities to reduce the whole load base in a structured way.
  - Once all the load is used there is no need for a contingency option.

- Concerns, to be strengthened in final draft:

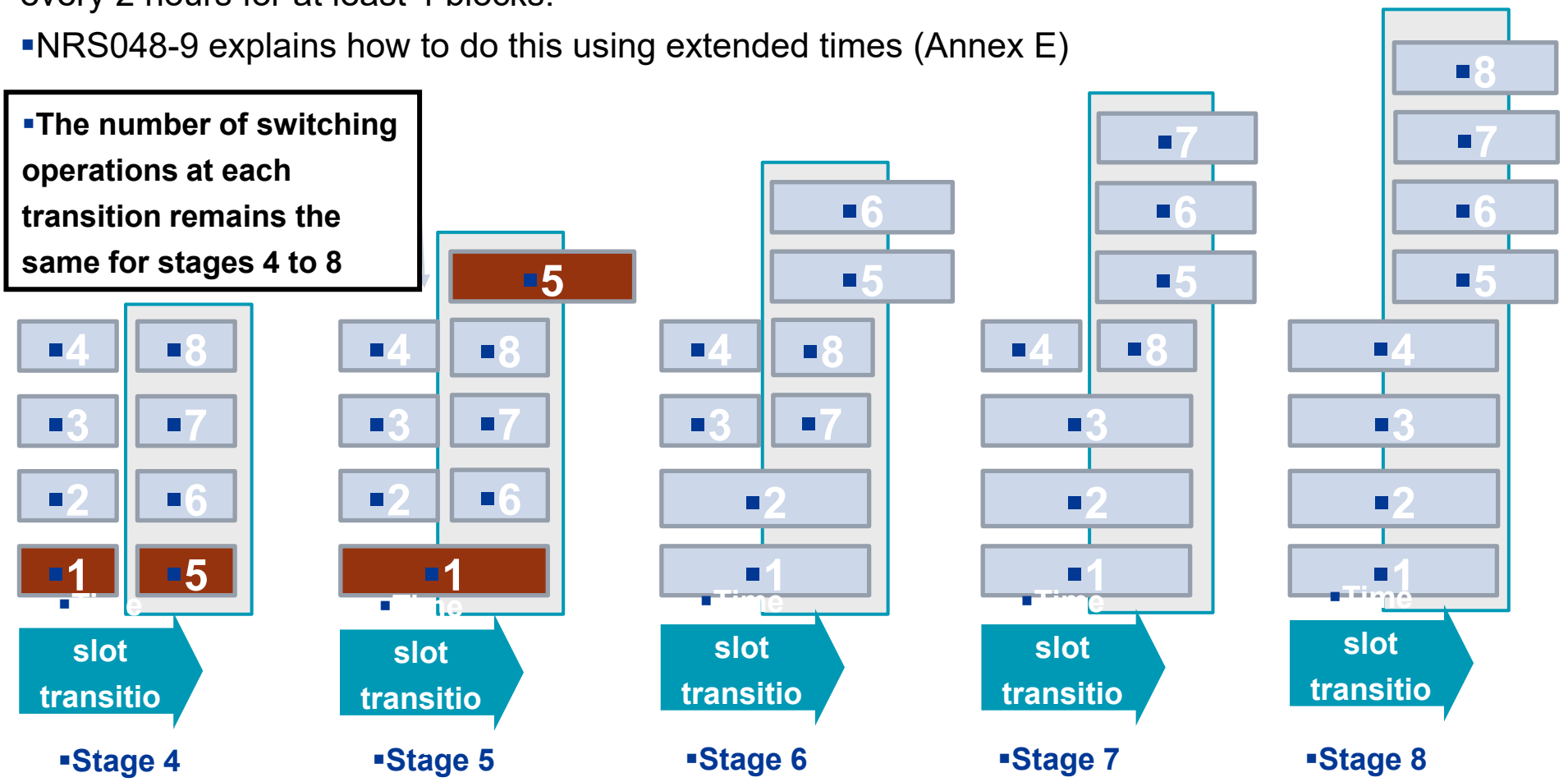
- Utilties are free to manage this in any way that meets the requirement, but shedding at these levels inevitably pressurises telecoms networks, batteries and other control systems. If a utility finds that they cannot shed above a particular stage they can ask their upstream supplier to shed them completely, as part of a schedule. This will undo the fine control over their own network.

Loadshedding

Significant changes – Stages 1-16

- Each incremental stage has an additional block shed simultaneously, 1 block in Stage 1, 8 blocks in Stage 8, all 16 blocks in Stage 16. Utilities may achieve this any way that retains equity and has rotation every 2 hours for at least 4 blocks.
- NRS048-9 explains how to do this using extended times (Annex E)

The number of switching operations at each transition remains the same for stages 4 to 8



Conclusions

Stages 1, 2, & 3 (NOTIFIED)

- Unless Edition 3 complies with existing legislation it will not replace Edition 2 as a license condition.
- Social interventions in the equity principle and others is possible via the DMA and governmental policy departments, not this specification.
- NCC may reduce the system demand in any way they see fit. Load shedding is a highly-controlled intervention to ensure the operability and security of the national power system.
- Loadshedding the entire base in a controlled way is possible but the effects of long duration outages on the network are just being experienced now.
- The comments provided to the NRS048-9 Working group were discussed and debated by focused task teams, but the comments are limited by the lack of smart technology in the existing ESI.

NRS Association

N R S

Thank you