

From VOR/DME to DME/DME Navigation

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DFS Deutsche Flugsicherung

Evolution of German / DFS NAV Infrastructure

- **Energy Transition: Compatibility of ATC and Wind Energy**

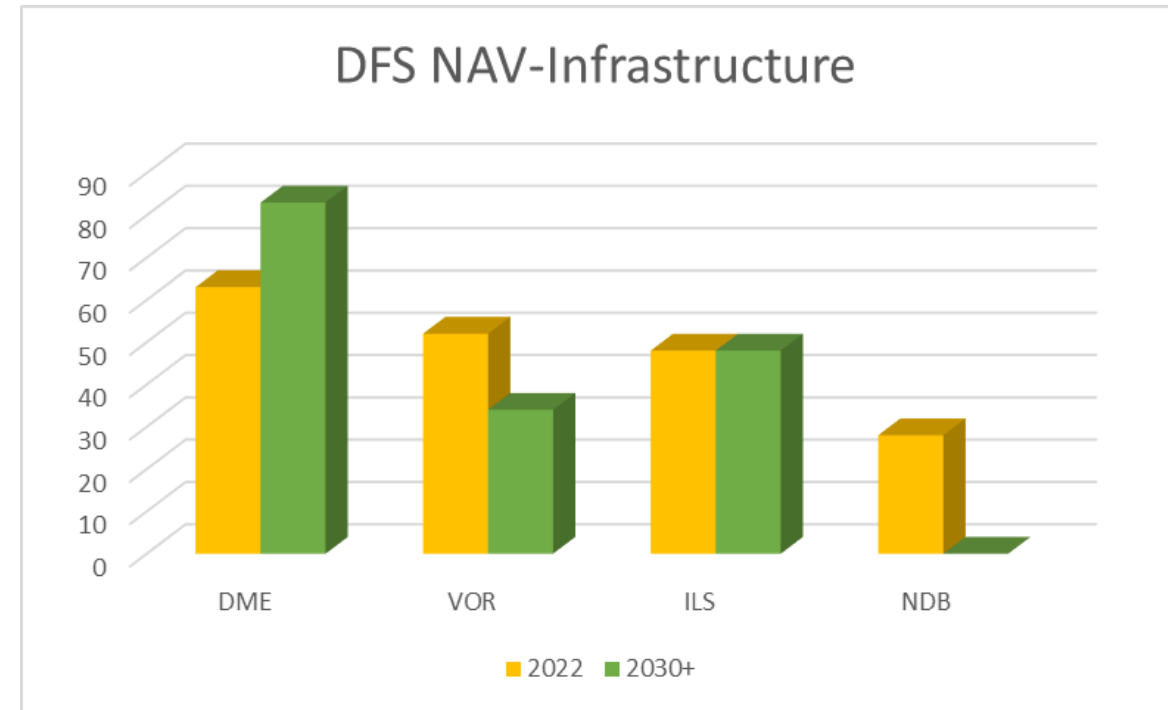
- Conversion of 7 CVOR into DVOR or DME

- **PBN-Implementation IR (EU) 2018/1048**

- Implementation of RNAV-1 SIDs / STARs
 - Replacement of VORDME by DME/DME
 - Reduction VORDME as required for ILS missed approach
 - Replacement of Marker NDBs by Sector-DME
- Decommissioning ILS CAT I tbd
- VOR MON based on AD sites

- **VOR/DME Renewal Programme**

- Renewal of 14 (+4) DVOR
- Conversion of 21 VORDME into stand-alone DME
- In total: 39 DME to be installed



DME: ENR and AD systems incl. Regional Airports, w/o ILS
ILS: 34 Cat III, 11 Cat I - only DFS

VOR Minimum Operational Network

- The VOR MON shall ensure safe navigation in a contingency case.
- The default fallback for GNSS in RNAV-1 is
 - DME/DME or
 - DME/IRU or
 - IRU (stand alone for 2 hrs)

In RNAV-5 VOR/DME forms an additional fallback solution.

- German MON approach assumes a complete outage of other RNAV sensors than VOR/DME as a very unlikely contingency case.

Therefore, the performance of the VOR MON shall allow for conventional (non-RNAV) navigation with only limited airspace capacity.

- This assumption needs to be confirmed.

- Based on conventional ATS routes the VOR MON shall connect major aerodromes with each other and with aerodromes in neighbouring countries.

Coverage & Conversion

▪ Range

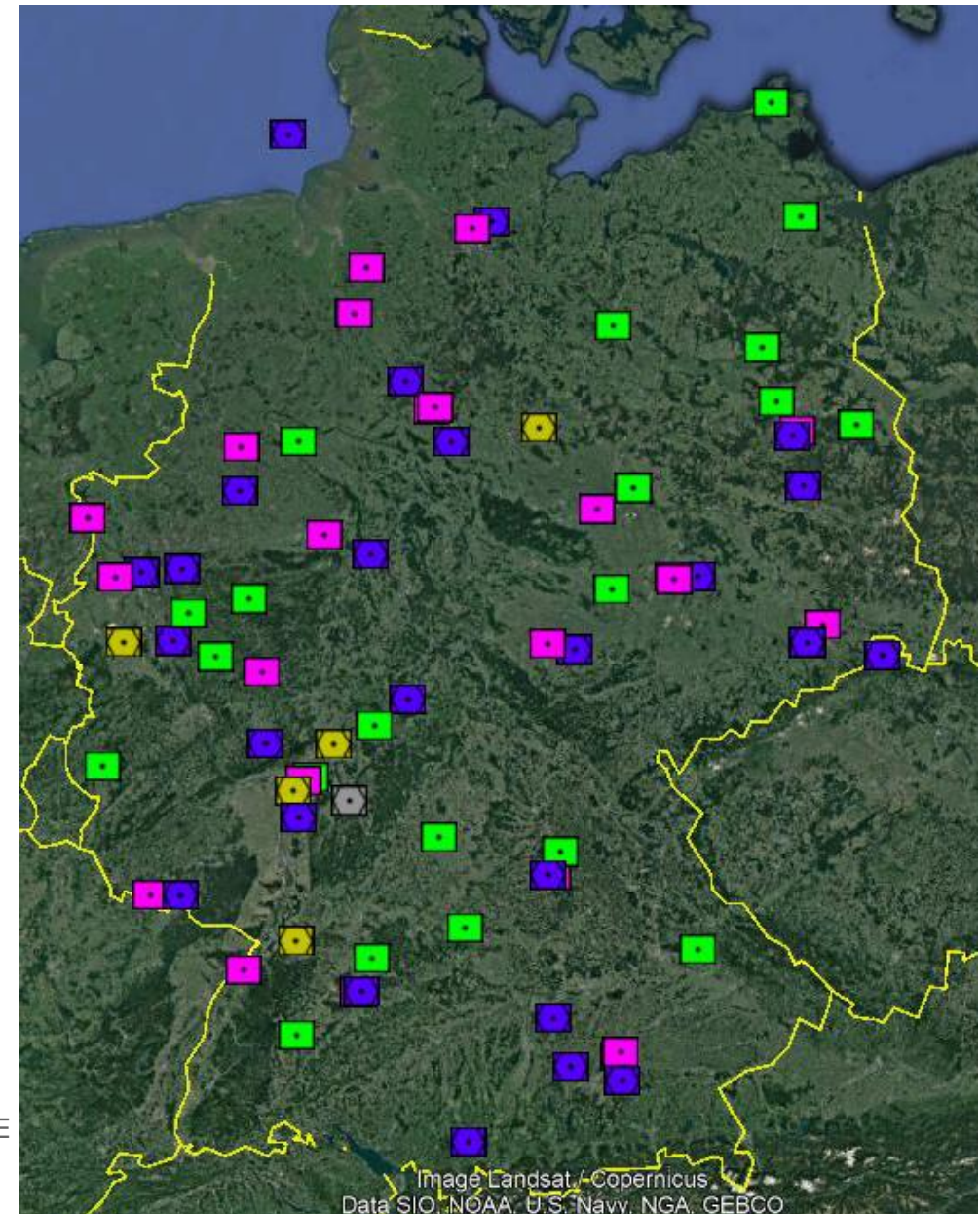
- RNAV-5: VOR will be usable up to a distance of 50 NM.
- Reduced range shall ease installation of wind turbines while maintaining RNAV-5 performance.
- Conventional Use: range is determined by DoC

▪ Conversion into DME

In the frame of the VOR/DME Renewal Programme each VOR-site per default is converted into a stand-alone DME unless there is no need for the VOR component

- derived from MON or
- in support of conventional SID/STARs
- in support of Missed Approach

- existing DME
- DVORDME
- VOR/DME → DME
- VOR/DME tbc



Note: Only for illustration purposes

Many Thanks for your Attention!



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