

# ***National report from Norway***

***by  
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NORWEGIAN MAPPING  
AUTHORITY

# *Reference networks*

- ❑ ***Two major national programs are about being completed***
  - ❑ ***Densification of the EUREF89 network.***
  - ❑ ***General plan for leveling and calculation of a new height system***



# *Hierarchy of the EUREF89 network*

## **❑ 3D-stations**

- ❑ 130 stations. The first realization of ETRS89 in Norway**
- ❑ 1994-1995**
- ❑ Processed by use of Gipsy**

## **❑ Stamnett (“1<sup>st</sup> order network”)**

- ❑ 770 points calculated in 1996**
- ❑ Adjustment of vectors of length ca 20 km**

## **❑ Landsnett (“2<sup>nd</sup> order network”)**

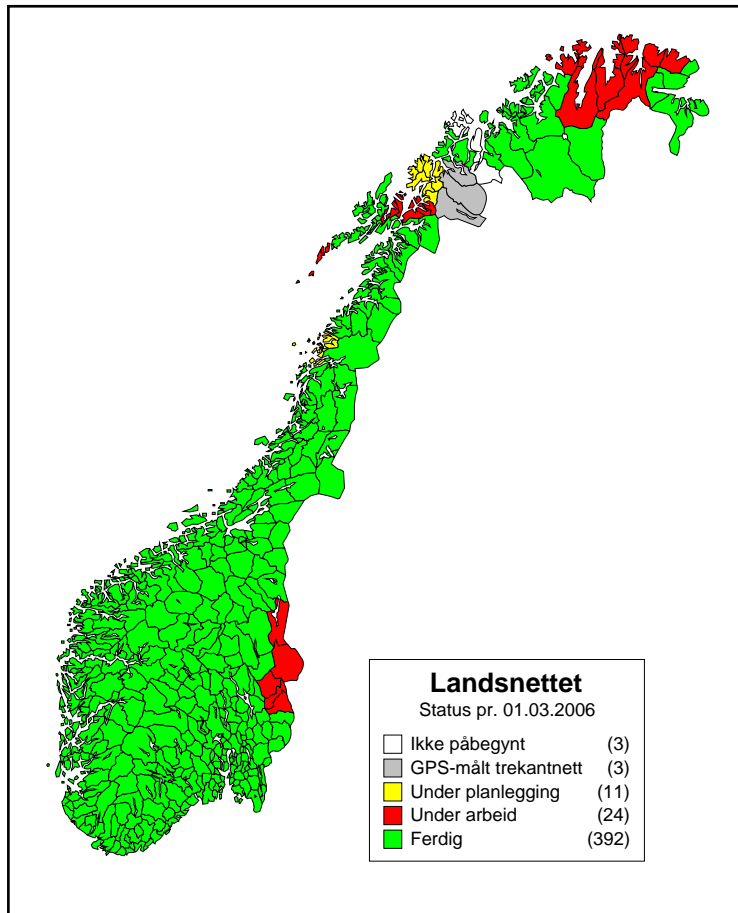
- ❑ A densification of Stamnett**
- ❑ 10657 points so far...**
- ❑ Completed in 2007**

## **❑ Old triangle network**

- ❑ All points recalculated. Completed in 2007**
- ❑ More than 50 000 points**



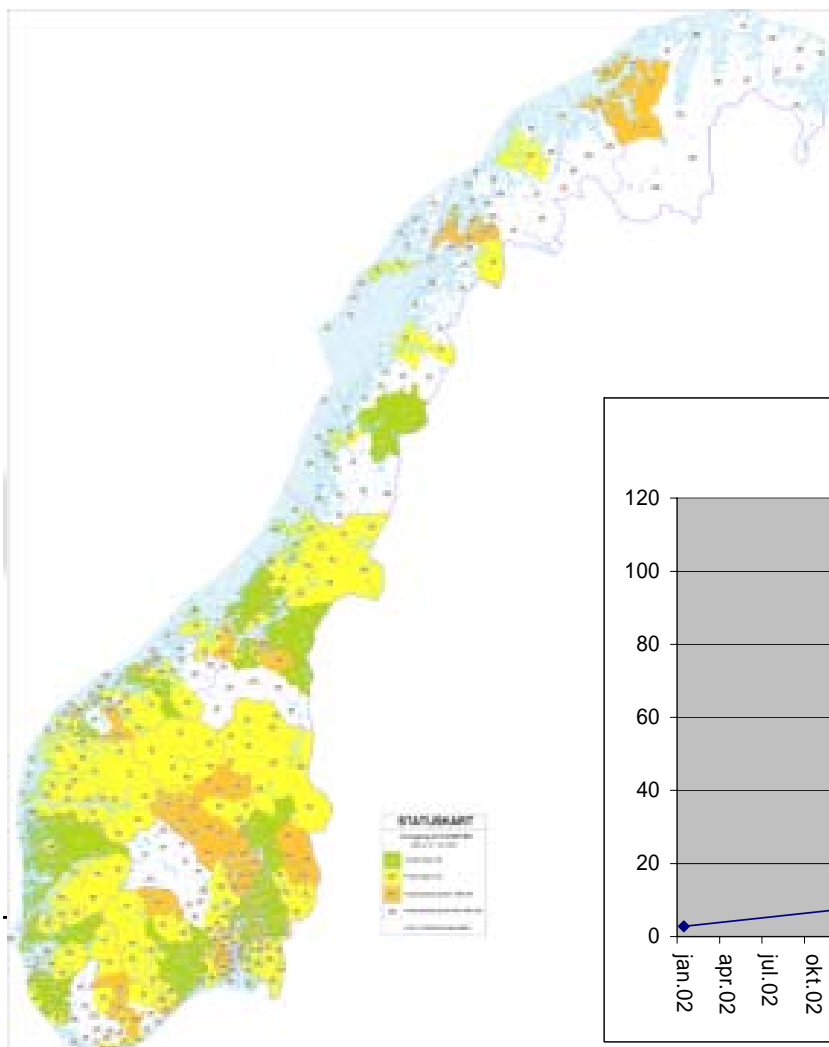
# Landsnett ("2<sup>nd</sup> order network")



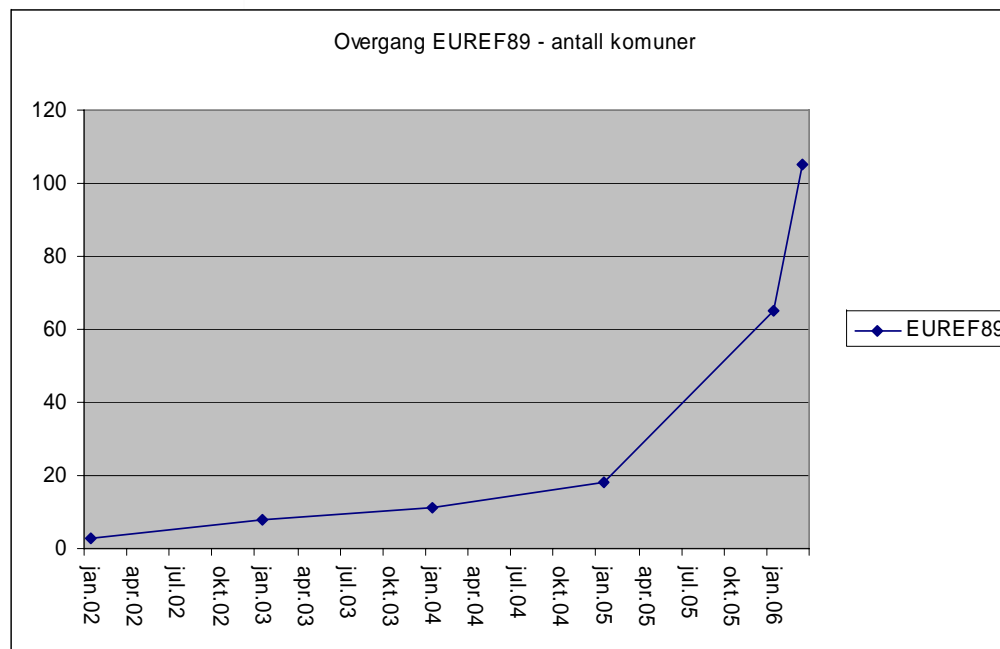
- ❑ **Established in 400 of 430 municipalities**
- ❑ **The municipalities, the road authorities and other official and private organizations supports financially**



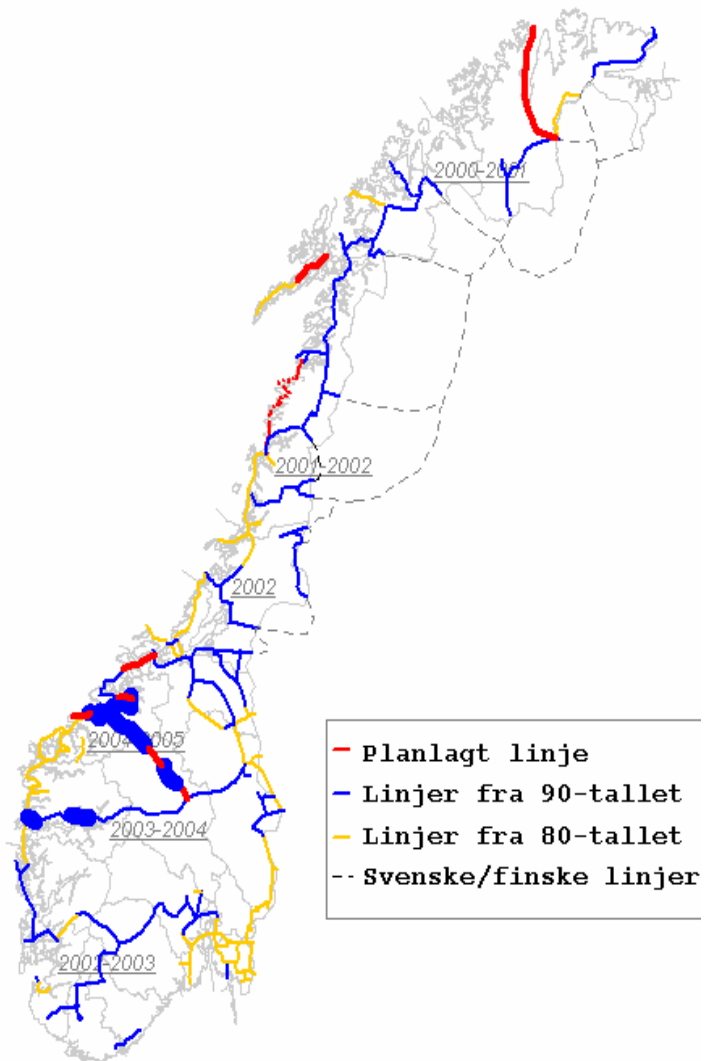
# EUREF89 in the municipalities



105 of 430 municipalities have changed to EUREF89



# General plan for leveling



- ❑ **The project started in 1980 as a cooperation with Sweden, Finland and Denmark within NKG**
- ❑ **The plan has been revised many times**
- ❑ **10 000 km has been leveled (360 km/yr)**
- ❑ **The whole network consist of are 20 000 1<sup>st</sup> order bench marks (many of the old ones are destroyed.)**



# ***New height system***

- More or less an extension of the new height systems in Sweden and Finland***
  - Fundamental point is 'New Amsterdam Peil'***
  - Normal heights***
  - Epoch 2000***
  - Zero tidal system***
  - Probably a slightly different land uplift model***
  
- Name: NN2000***



# ***NN2000-heights in Landsnett***

- ❑ Some Landsnett-points are leveled, but most of them are GPS-measured only***
  
- ❑ However, a geoid model fitted to 2 100 points gps/leveling (height reference model) gives NN2000 heights better than 3 cm***
  - ✓ If the distance to the nearest gps/leveling point is more than 10-15 km the accuracy is lower***
  
- ❑ More leveling is necessary to obtain reliable NN2000 heights in the Landsnett countrywide***



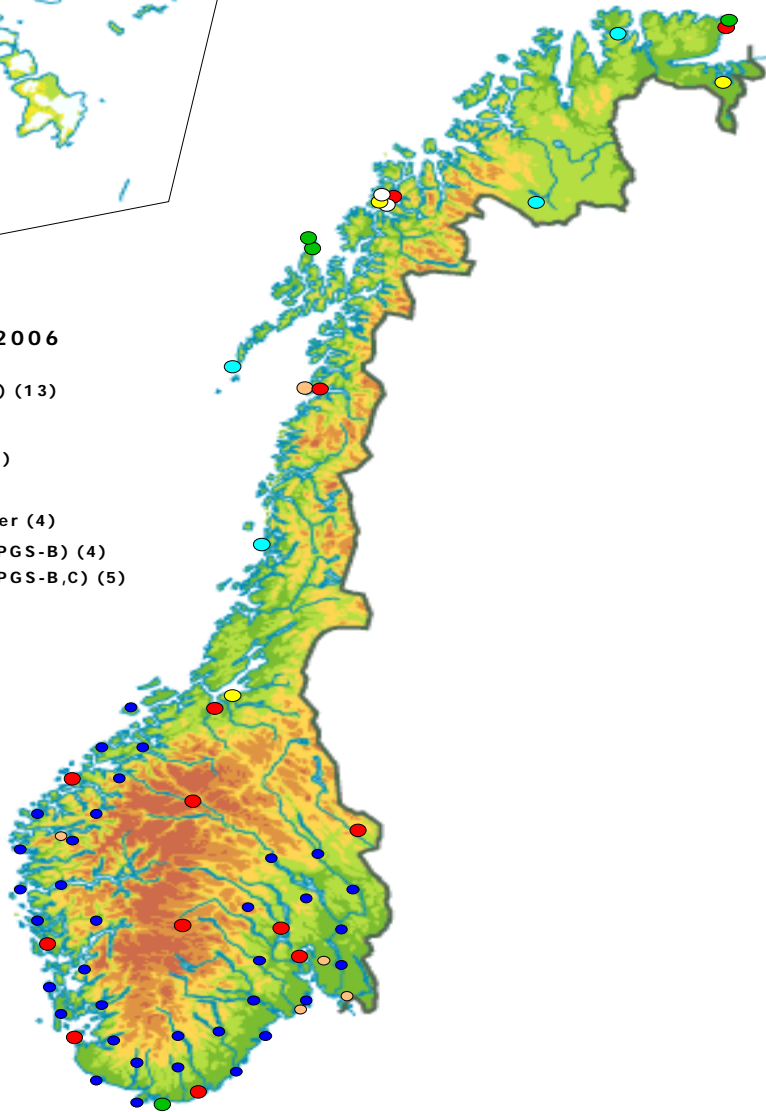


## Permanent Geodetic Stations



Status 15.06.2006

- PGS-B (SATREF) (13)
- PGS-C (35)
- EGNOS RIMS (3)
- IGS (4)
- Tide gauge, other (4)
- Planned 2006 (PGS-B) (4)
- Remove 2006 (PGS-B,C) (5)



□ PGS-B	13
□ PGS-C	35 (+4)
□ IGS	4
□ EGNOS	3
□ Other	4
□ <u>In total</u>	<u>67</u>



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