

# WEBINAR 03: PreSale Sample creation : Create a new optimization called “Northern Italy” for the area “italy north of Florence”.- It is ba

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## Bernd Welter (12/04/2026 12:43:16)

Create a new optimization called “Northern Italy” for the area “italy north of Florence”. - It is based on 5 depots, each being in charge of 2 trucks of each small (van, costPerKilometer=1.00), medium (12t, costPerKilometer=1.5) and large size (40t, costPerKilometer=2.5).

- I want to plan 300 orders with volume between 2, 5 and 10 palettes and the customers. 90% of the orders are deliveries, 10% are pickups
- planning horizon is a single day with all drivers being available 08:00 till 18:00 with a 1 hour break between 12:00 and 14:00. 5% of the drivers belong to the category “rookie” and they need additional 5% of time when serving an order. Another 5% are “Experts” who need 5% less time when serving an order

## PTV Mira (12/04/2026 12:44:16)

I'll start by researching the relevant articles for creating this optimization scenario. Now let me fetch the API schema for starting an optimization, and also check the routing profiles available for Europe. Let me get the exact profile names. Now I have all the information I need. Let me first check the geographic bounds for northern Italy to plan the depot locations. All 5 cities are valid. Now let me plan the full scenario and request approval.

## Bernd Welter (12/04/2026 12:46:03)

before we execute the planning perform the following changes: - add the tag “webinar” to the scenario. - make sure that the amount of palettes of an order affects the duration for pickup and delivery with 2 minutes per palette

## PTV Mira (12/04/2026 12:46:21)

Got it — two changes before we start:

1. **Add tag** `webinar`
2. **Order duration scales with volume:** 2 minutes (120s) per palette — so a 2-palette order = 4 min, 5-palette = 10 min, 10-palette = 20 min

This means the duration on each order's pickup/delivery task should be `volume × 120` seconds instead of a flat 5 minutes.

Let me re-submit the updated plan:

### Bernd Welter (12/04/2026 12:46:26)

### PTV Mira (12/04/2026 12:47:33)

Let me fix the nested iteration issue — the vehicle generation needs a different approach. Locations generated. Now let me build the full optimization with a corrected vehicle generation approach. The optimization [Northern Italy](#) is now running. Here's a summary:

Component	Details
Depots	5 — Milano, Torino, Verona, Bologna, Genova
Vehicles	30 (10 vans, 10 medium 12t, 10 large 40t)
Orders	300 (270 deliveries + 30 pickups)
Volumes	2, 5, or 10 palletes per order
Service duration	2 min/palette (4, 10, or 20 min)
Working hours	08:00–18:00 Europe/Berlin
Break	1h between 12:00–14:00 (max 4h working)
Driver skills	1 rookie (+5%), 1 expert (-5%), 28 standard
Tags	<code>northern-italy</code> , <code>multi-depot</code> , <code>webinar</code>
Duration	10 min — estimated completion ~12:56 Europe/Berlin

### Bernd Welter (12/04/2026 13:05:40)

create an almost similar example but change the region to belgium and therefore add the tag "belgium"

### PTV Mira (12/04/2026 13:06:06)

I need to adapt the scenario for Belgium. Let me find 5 suitable Belgian depot cities first. All 5 cities confirmed. Now let me get the Belgium country bounds for order generation and request approval.

### Bernd Welter (12/04/2026 13:07:04)

### PTV Mira (12/04/2026 13:07:51)

Belgium bbox: lon 2.55–6.41, lat 49.50–51.50. Let me create the optimization now. The [Belgium](#) optimization is now running. Here's a side-by-side comparison:

	Northern Italy	Belgium
Depots	Milano, Torino, Verona, Bologna, Genova	Bruxelles, Antwerpen, Gent, Liège, Charleroi

	Northern Italy	Belgium
<b>Vehicles</b>	30 (identical setup)	30 (identical setup)
<b>Orders</b>	300 (270 del + 30 pu)	300 (270 del + 30 pu)
<b>Duration/palette</b>	2 min × volume	2 min × volume
<b>Tags</b>	northern-italy , multi-depot , webinar	belgium , multi-depot , webinar
<b>Est. completion</b>	~13:16 Europe/Berlin	~13:16 Europe/Berlin

Everything else (vehicle types, costs, breaks, driver skills, traffic mode) is identical.

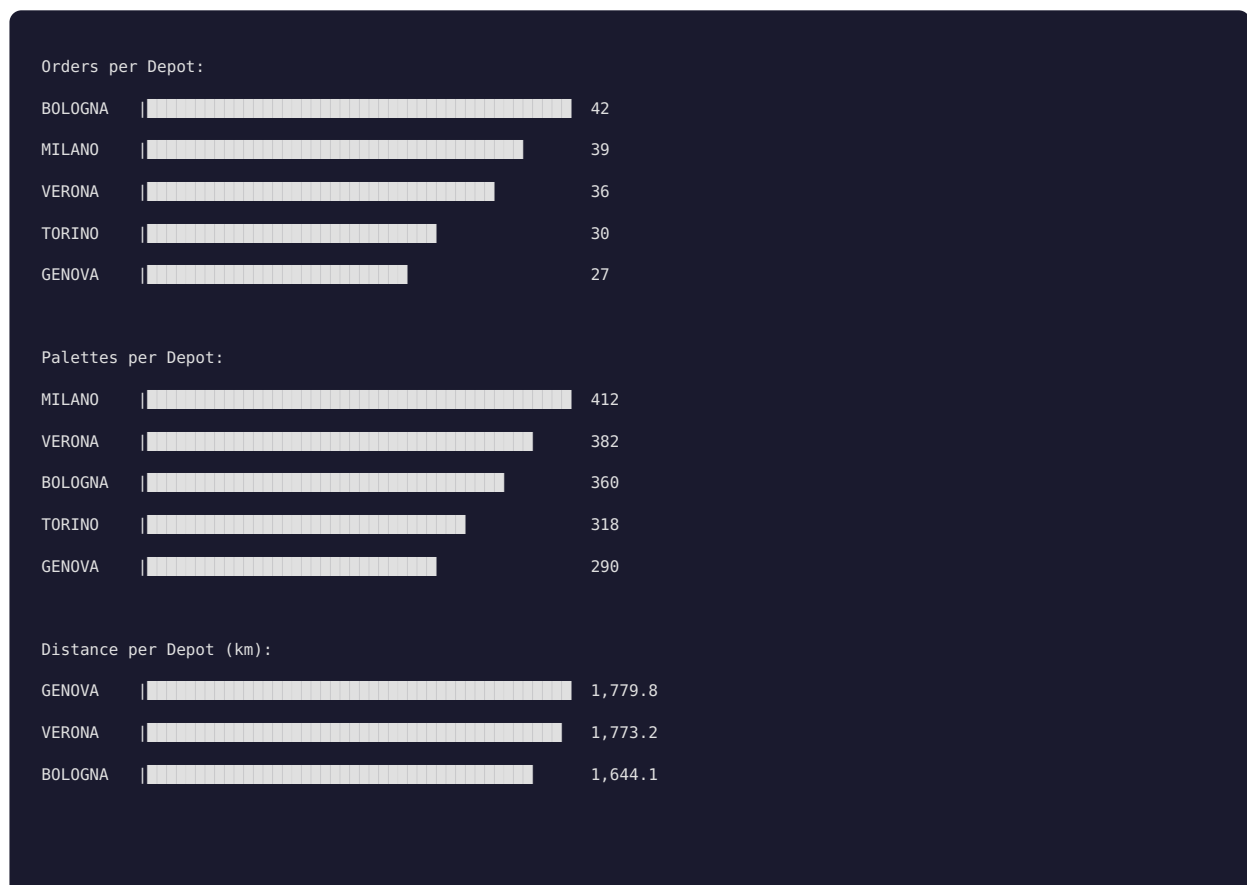
## Bernd Welter (12/04/2026 14:04:43)

create a chart that displays the utilization of the depots

## PTV Mira (12/04/2026 14:05:56)

Let me first check the relevant analysis documents and then query both optimizations for depot utilization data. Now let me fetch the schemas needed and query both optimizations for depot utilization. Now let me query both optimizations for depot utilization — orders handled per depot and routes per depot. Let me fix the type issue with the vehicle-to-depot mapping. Now let me also check unscheduled orders for context. Here's the depot utilization comparison across both scenarios:

### Northern Italy (174 scheduled / 126 unscheduled)



MILANO		1,527.6
TORINO		1,511.9

## Belgium (279 scheduled / 21 unscheduled)

### Orders per Depot:

LIEGE		60
GENT		58
CHARLEROI		57
ANTWERPEN		55
BRUXELLES		49

### Palettes per Depot:

GENT		646
LIEGE		610
BRUXELLES		606
CHARLEROI		598
ANTWERPEN		556

### Distance per Depot (km):

CHARLEROI		1,385.2
LIEGE		1,289.8
ANTWERPEN		1,231.8
GENT		1,153.8
BRUXELLES		1,091.6

## Key Observations

Metric	Northern Italy	Belgium
<b>Scheduled</b>	174 / 300 (58%)	279 / 300 (93%)
<b>Unscheduled</b>	126	21
<b>Total distance</b>	8,236.6 km	6,152.2 km
<b>Total cost</b>	€22,635.95	€19,050.24

Belgium's much higher scheduling rate (93% vs 58%) is likely driven by the smaller geographic area — Belgium is ~30,700 km<sup>2</sup> vs northern Italy's much larger spread (~120,000 km<sup>2</sup>), meaning shorter distances between stops and more orders reachable within the 10-hour working window.

## Bernd Welter (13/04/2026 14:54:49)

Analyze why 126 orders are unscheduled in Northern Italy

## PTV Mira (13/04/2026 14:56:08)

Now let me run the Step 1 overview analysis and the Step 2b constraint analysis in parallel. Key findings so far: all 126 unscheduled orders are **POSSIBLE** (125) or UNKNOWN (1), all are **mandatory**, all 30 vehicles are in use, and the only constraint reason is **timing** with **0% vehicle impossibilities**. This points to route time saturation. Let me now check the geographic distance comparison to confirm. The picture is very clear. Here's the full analysis:

## Unscheduled Orders Analysis — Northern Italy

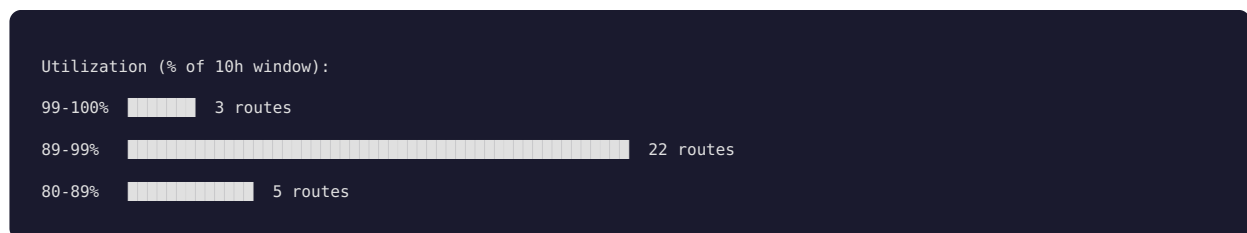
### Overview

Metric	Value
Total orders	300 (all <b>mandatory</b> )
Scheduled	174 (58.0%)
Unscheduled	126 (42.0%)
Vehicles	30 total, <b>30 used</b> (100%)
Schedulability	125 POSSIBLE, 1 UNKNOWN
Constraint reason	<b>Timing</b> (126/126 orders, 0% vehicle impossibilities)

### Root Cause: Time Saturation

The **sole** constraint reason is “**Order or vehicle timing constraints**” with **zero vehicle impossibilities**. This means no vehicle is structurally blocked — every vehicle *could* theoretically serve every order. The problem is that all routes are already full in time.

### Route Time Utilization

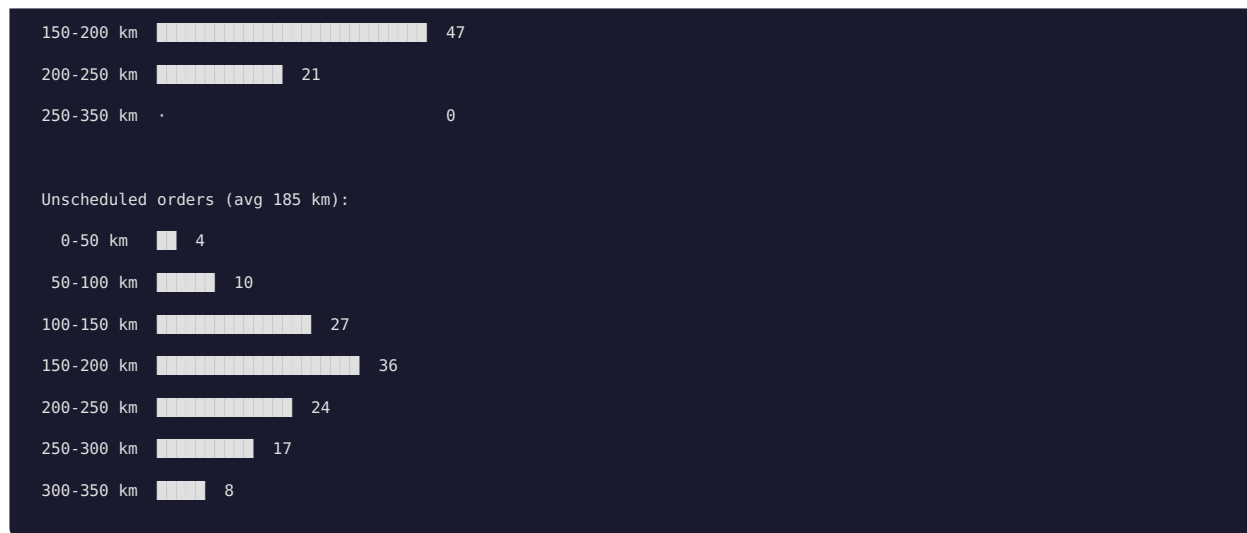


**All 30 routes run at 80-100% time utilization** — average ~88%. With 5.8h driving + 1.9h tasks + 1.2h breaks per route, there's virtually no slack left.

### Geographic Distance: The Key Differentiator

Distance from depot centroid (km):





Unscheduled orders are on average **46% farther** from depots (185 km vs 127 km). The 250–350 km range is exclusively unscheduled — these distant orders consume too much driving time to fit into already-saturated routes.

## Diagnosis

This is a **general capacity problem**, not an outlier issue:

1. **Northern Italy is geographically large** (~120,000 km<sup>2</sup>) — long driving distances eat into the 10h working window
2. **All 30 vehicles are fully utilized** at 80–100% time capacity
3. **No structural constraints** block any vehicle-order combination
4. The optimizer prioritizes closer orders to maximize the number of scheduled orders within the time budget
5. Distant orders (especially 200+ km from any depot) get pushed out

For comparison, the Belgium scenario schedules 93% of orders with the same fleet — Belgium is ~4× smaller geographically, so driving distances are much shorter.

## Bernd Welter (13/04/2026 14:56:37)

Do 1 and 2 at the same time

## PTV Mira (13/04/2026 14:57:05)

Two scenarios from the current Northern Italy optimization:

1. **Add more vehicles** (keep 08:00–18:00)
2. **Extend working hours** to 06:00–20:00 (keep 30 vehicles)

Now I need to figure out how many vehicles to add. Currently 30 vehicles serve 174/300 orders. Let me determine a reasonable number, then request approval for both scenarios.

## Bernd Welter (13/04/2026 14:57:58)

## PTV Mira (13/04/2026 14:58:51)

Both approved. Let me launch them simultaneously. Scenario 1 is running. Scenario 2 had an issue with timeSlots — let me fix that. Both scenarios are now running:

Scenario	ID	Change	Est. completion
<a href="#">Northern Italy - More Vehicles</a>	3256155d	+20 vehicles (50 total)	~15:07 Europe/Berlin
<a href="#">Northern Italy - Extended Hours</a>	c4925650	06:00–20:00 (14h vs 10h)	~15:07 Europe/Berlin

Both warm-start from the current [Northern Italy](#) solution (174 scheduled orders).

## Bernd Welter (13/04/2026 15:01:40)

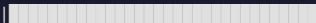

Check the progress of the two running optimizations

## PTV Mira (13/04/2026 15:02:06)

Both are still running (~5 min in, ~5 min remaining). Here's the intermediate progress compared to the baseline:

	Baseline (30 veh)	More Vehicles (50 veh)	Extended Hours (14h window)
Scheduled	174	238	250
Unscheduled	126	62	50
Planning rate	58%	79%	83%
Routes	30	50	30
Total cost	€22,636	€36,727	€33,024
Total distance	8,237 km	14,237 km	11,704 km

Improvement vs baseline (intermediate):

More Vehicles		+64 orders (+37%)
Extended Hours		+76 orders (+44%)

Early indication: **Extended Hours is outperforming More Vehicles** — scheduling 250 vs 238 orders with fewer routes (30 vs 50) and lower total cost (€33k vs €37k). This could mean the bottleneck is primarily driving time, not fleet size. These are intermediate results — final numbers may shift in the remaining ~5 minutes.

## Bernd Welter (13/04/2026 15:03:26)

Now duplicate all the vehicles in the scenario with the extended hours

## PTV Mira (13/04/2026 15:03:42)

## Bernd Welter (13/04/2026 15:04:57)

## PTV Mira (13/04/2026 15:05:25)

[N-Italy - Ext Hours + Double Fleet](#) is now running.

Scenario	Vehicles	Hours	Status
<a href="#">Northern Italy</a> (baseline)	30	08:00–18:00	✔ Done
<a href="#">More Vehicles</a>	50	08:00–18:00	Running
<a href="#">Extended Hours</a>	30	06:00–20:00	Running
<a href="#">Ext Hours + Double Fleet</a>	<b>60</b>	<b>06:00–20:00</b>	Running

Estimated completion ~15:13 Europe/Berlin. This combines both improvements — should reveal whether the remaining ~50 unscheduled orders from the extended hours scenario need more fleet capacity or are simply too remote.

## Bernd Welter (13/04/2026 15:08:36)

display only the routes of the top 10% distances

## PTV Mira (13/04/2026 15:08:58)

Filtered to the **5 longest routes** (top 10% of 43 active routes,  $\geq 590$  km):

	Distance	Orders	Driving	Cost
BOLOGNA_VAN_1_DUP	739.6 km	5	10.0h	€1,087
VERONA_VAN_1	650.5 km	8	9.4h	€999
BOLOGNA_VAN_1	606.3 km	10	8.6h	€954
BOLOGNA_VAN_2_DUP	595.9 km	6	8.6h	€944
VERONA_VAN_1_DUP	589.9 km	6	9.5h	€938

All 5 are **vans** from **Bologna** and **Verona** — the two easternmost depots, which likely serve the most geographically spread orders. Driving times range from 8.6h to 10.0h, close to the 14h window limit.

## Bernd Welter (13/04/2026 15:09:54)

go back to all routes

## PTV Mira (13/04/2026 15:10:02)

Filter cleared — all routes are visible again.

## Bernd Welter (13/04/2026 15:11:58)

Calculate the toll

## PTV Mira (13/04/2026 15:12:18)

I need the routing API schema before I can write the query. Now I have both schemas. Let me request approval for the routing API call and then calculate the toll for the active route `BOLOGNA_LRG_1`.

## Bernd Welter (13/04/2026 15:12:47)

## PTV Mira (13/04/2026 15:13:19)

### Toll Costs — Route BOLOGNA\_LRG\_1 (EUR\_TRUCK\_40T)

<b>Total toll</b>	<b>€6.31</b>
<b>Country</b>	Italy
<b>Toll system</b>	Pedaggi (tariff 2026-03)
<b>Route distance</b>	315.9 km
<b>Waypoints</b>	14 (depot + 12 stops + return)

### Toll sections:

Section	Distance	Cost
BOLOGNA CASALECCHIO → VALSAMOGGIA	12.3 km	€2.05
PISTOIA → CALENZANO-SESTO FIORENTINO	27.7 km	€4.26
	40.0 km	€6.31

Only 40 km of the 315.9 km route is on tolled motorways — the rest uses toll-free roads. The toll cost is relatively low at €6.31 for a 40t truck.

## Bernd Welter (17/04/2026 15:20:32)

ANalyze this result!

## PTV Mira (17/04/2026 15:21:31)

This is a different optimization than what we've been working on. Let me analyze this optimization. Let me run the analysis queries in parallel — overview metrics, cost breakdown, time breakdown, and

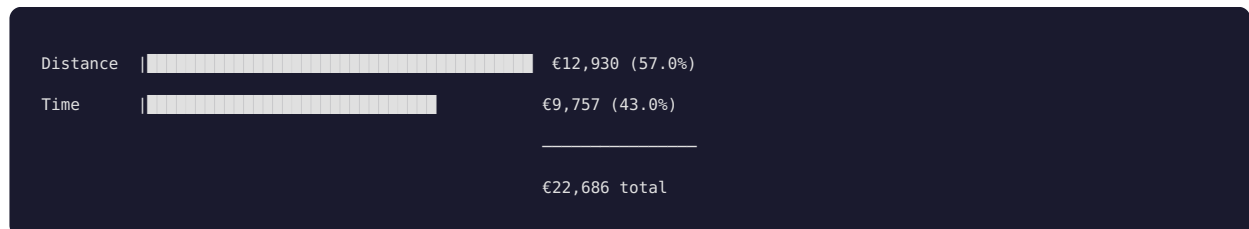
ratios. This optimization is still **RUNNING** — the results below are intermediate but already quite stable (similar to the baseline Northern Italy we analyzed earlier).

## Result Analysis — Northern Italy

### Overview

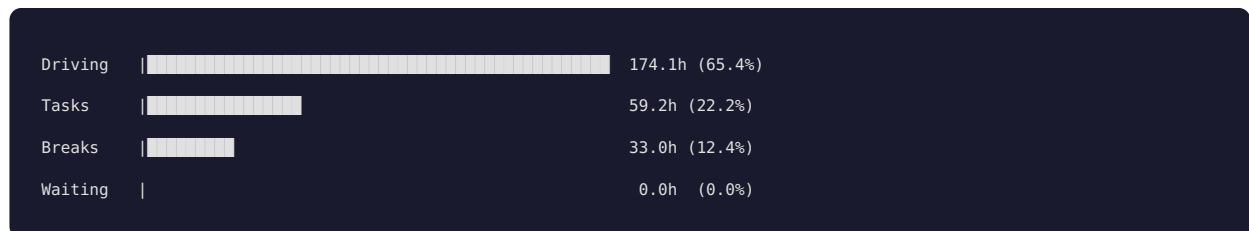
Metric	Value
Status	RUNNING
Orders	300 (270 deliveries + 30 pickups)
Scheduled	175 / 300 ( <b>58.3%</b> )
Unscheduled	125 (all mandatory)
Routes	30 (all 30 vehicles used)
Depots	5
Total distance	8,223.8 km
Total duration	266.3 h
Total cost	€22,686.47
Opt. duration	600s (10 min)

### Cost Breakdown



No fixed, stop, outsourcing, or unused vehicle costs — cost is purely driven by distance and time.

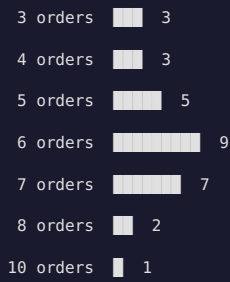
### Time Breakdown



Zero waiting time — routes are well-packed with no idle gaps.

### Route Distributions

**Orders per route** (avg 5.8, range 3–10):



**Distance per route** (avg 274 km, range 175–412 km):



**Duration per route** (avg 8.9h, range 8.0–10.0h):



Nearly all routes run **8.5–10.0h** out of the 10h window — confirming heavy time saturation.

## Key Ratios

Ratio	Value
km / vehicle	274.1 km
hours / vehicle	8.9 h
orders / vehicle	5.8
stops / vehicle	7.3
km / order	47.0 km
min / order	91.3 min

The 91 min/order is high — driven by long inter-stop distances in northern Italy's large geographic area. The 42% unscheduled rate is a direct consequence of time saturation across all 30 routes.

## Bernd Welter (17/04/2026 15:22:29)

Analyze why 125 orders are unscheduled

## PTV Mira (17/04/2026 15:23:22)

This is the same scenario type we analyzed before. Let me run the diagnostics.## [Unscheduled Orders Analysis — Northern Italy](#)

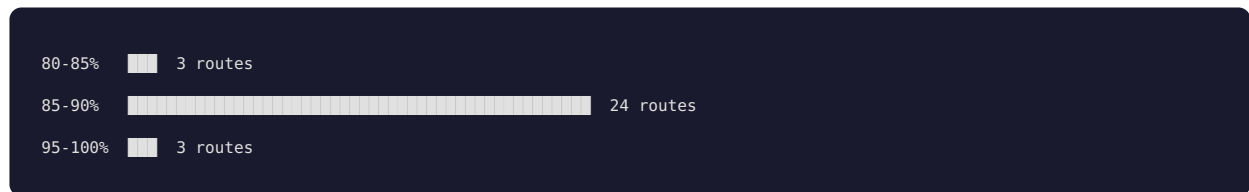
### Diagnostics Summary

Metric	Value
Unscheduled	125 (all mandatory)
Analyzed	125 / 125 (100%)
Schedulability	123 POSSIBLE, 2 UNKNOWN
Constraint reason	Timing (125/125, 0% vehicle impossibilities)
Vehicles	30 total, 30 used (0 unused)

All 125 orders are **POSSIBLE** — meaning the optimizer found valid insertion points at some stage but couldn't fit them all simultaneously. The **sole** reason is **timing constraints** with **zero vehicle impossibilities** — no vehicle is structurally blocked from serving any order.

### Root Cause: Time Saturation

Route utilization (% of 10h window):

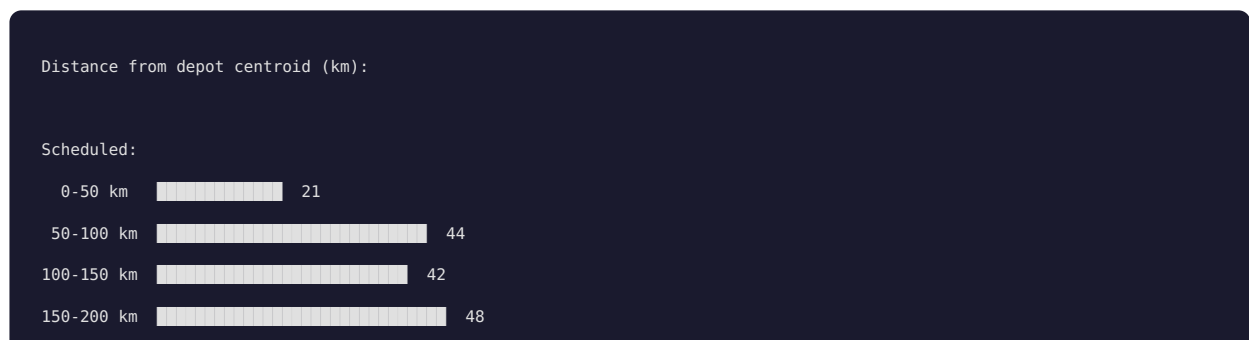


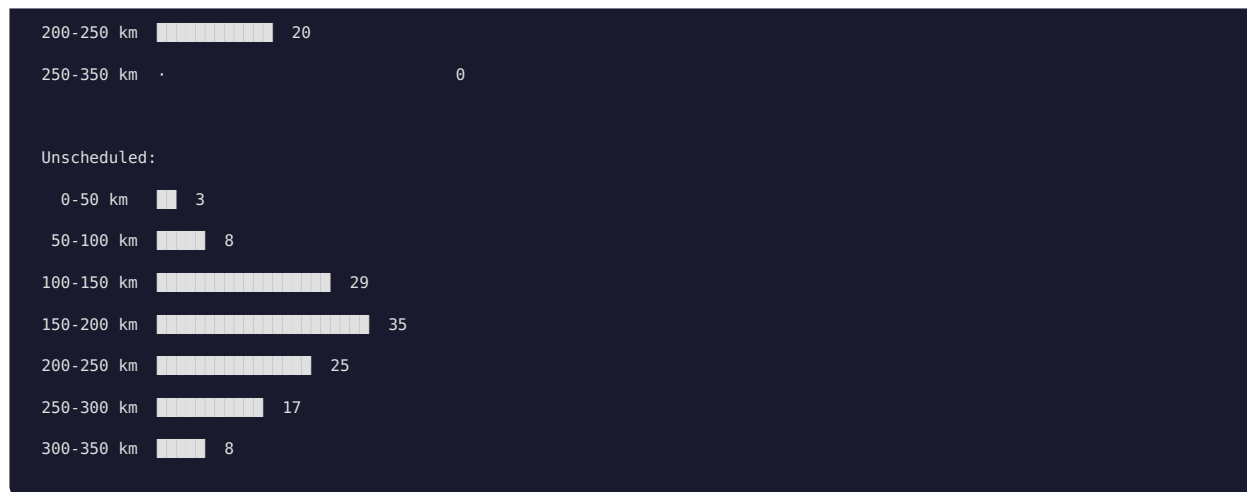
Avg: **89.0%** | Min: 80.4% | Max: 99.9%

All 30 routes are packed at 80–100% time utilization. There is virtually no slack to insert additional orders.

### Geographic Distance: Scheduled vs Unscheduled

	Scheduled (175)	Unscheduled (125)
Avg distance from depots	126 km	187 km (+49%)
Min	7.6 km	15.8 km
Max	240 km	337 km





The pattern is clear: unscheduled orders are **significantly farther** from depots. The 250–350 km range is **exclusively unscheduled** — these distant orders require too much driving time to fit into already-saturated routes.

## Diagnosis

This is a **general time-capacity problem**, not an outlier issue:

1. **All 30 vehicles are fully utilized** — no idle fleet
2. **No structural constraints** block any vehicle-order combination
3. **Northern Italy's large geographic area** (~120,000 km<sup>2</sup>) means long driving distances
4. The optimizer prioritizes closer orders to maximize the number scheduled within the 10h window
5. Distant orders (200+ km from any depot) get pushed out due to insufficient time budget

This matches the pattern we saw in the earlier Northern Italy optimization — the extended hours and double fleet scenarios showed that adding time (+40% window) was more effective than adding vehicles alone.