



Deep Winter Greenhouse

CONSTRUCTION, PRODUCTION, AND ENTERPRISES ANALYSIS

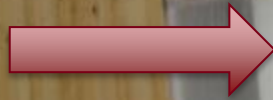
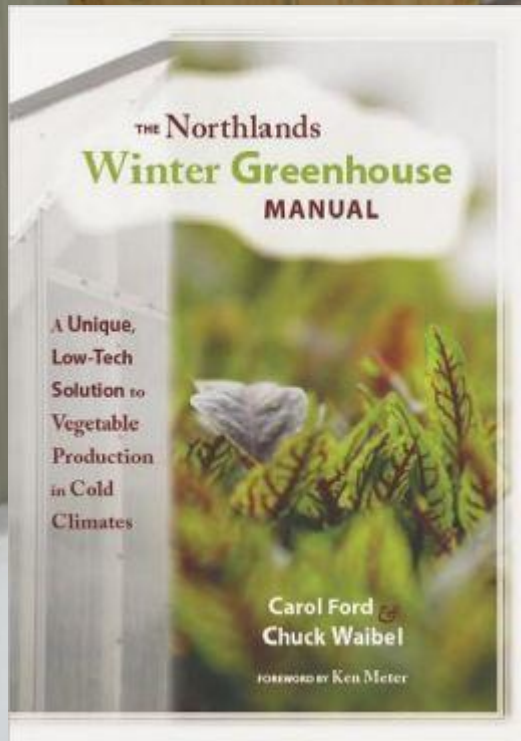
AGENDA

- Deep winter greenhouse production system
- Building
- Growing
- Profiting

LIDA FARM



Elements of Deep Winter Greenhouses



Passive solar



PRODUCTION SYSTEM

- Continuous planting
 - Oct thru Feb
- Cold-season greens
 - Brassicas / Asian
- Vertical growing



LIDA FARM PROJECT



LIDA FARM PROJECT

- 3 elements
 - Root Cellar
 - Cottage
 - Winter Greenhouse
 - Passive solar
 - Solar thermal
 - Radiant floor heat
 - Wood boiler integration
 - Hillside construction

WHY WINTER GREENHOUSE

- **Fit into farm goals**
- **Complementary enterprise**
 - Propane
 - Organic onions anyone?
 - High tunnel starts
- **Off-season revenue**

THE SITE



TOURIST COTTAGE: 14 X 20



HILLSIDE CONSTRUCTION



INSULATED WALLS



STICK CONSTRUCTION

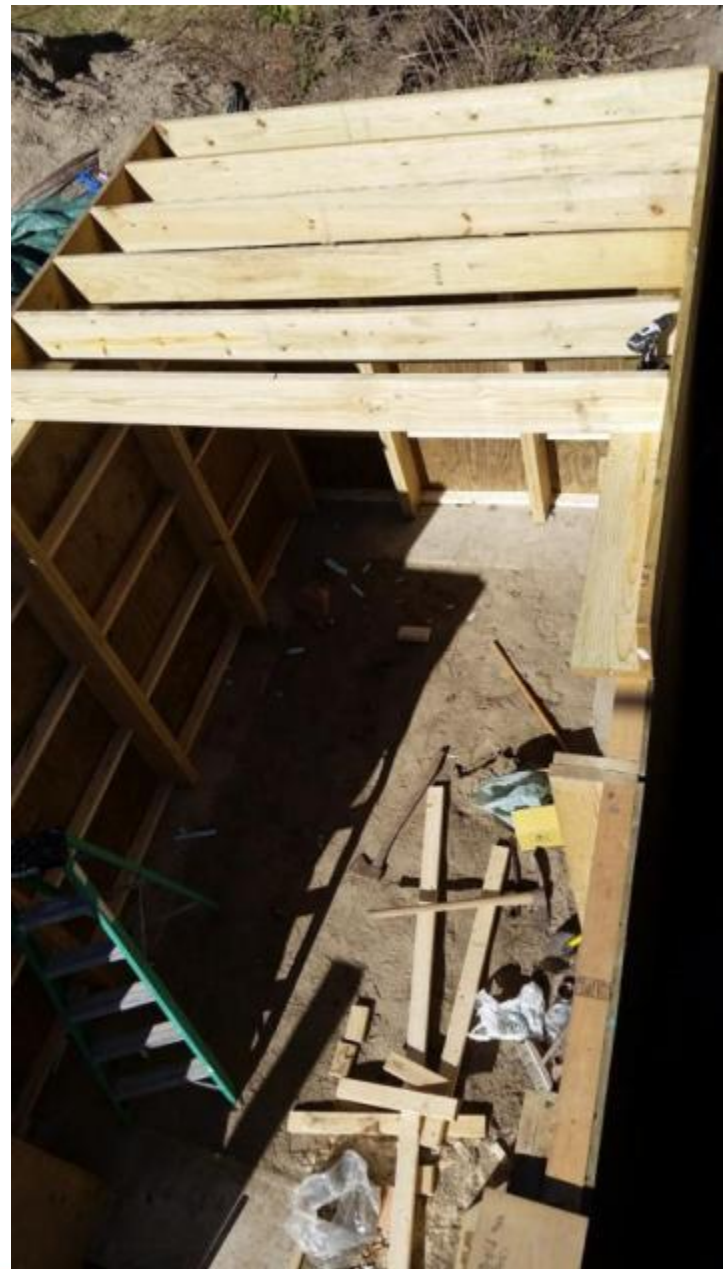






ROOT CELLAR





DIRT WORK



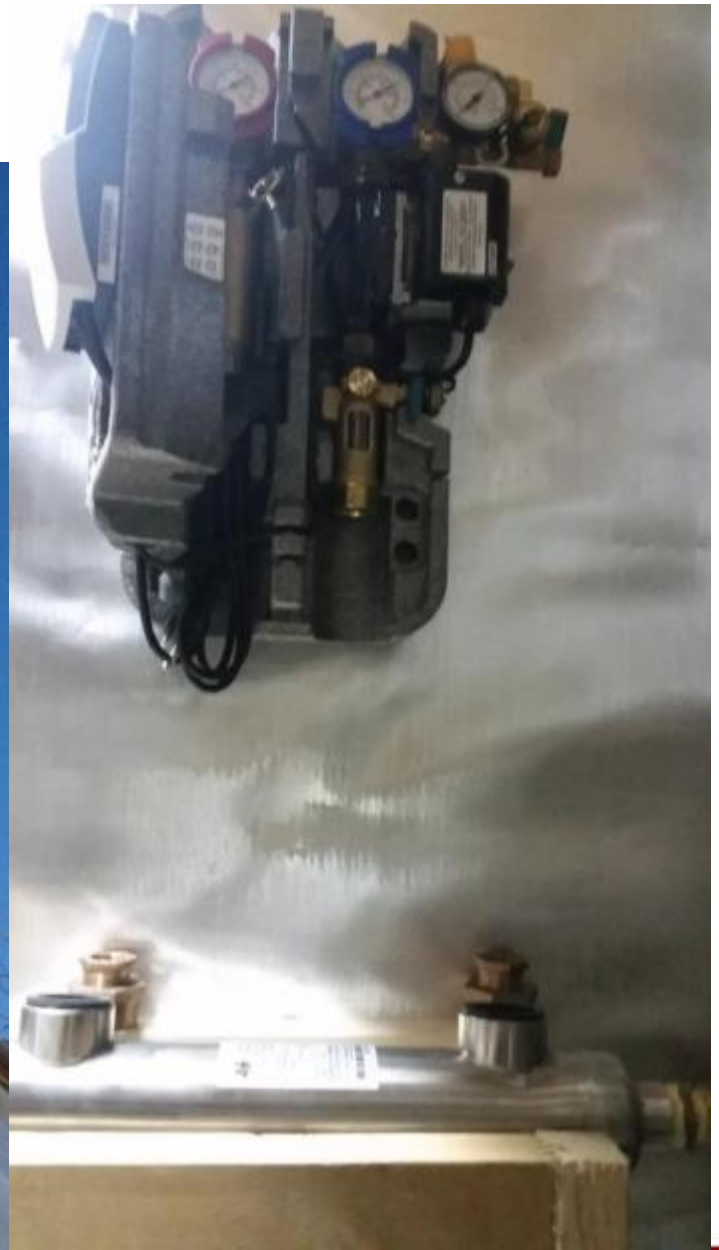








SOLAR THERMAL



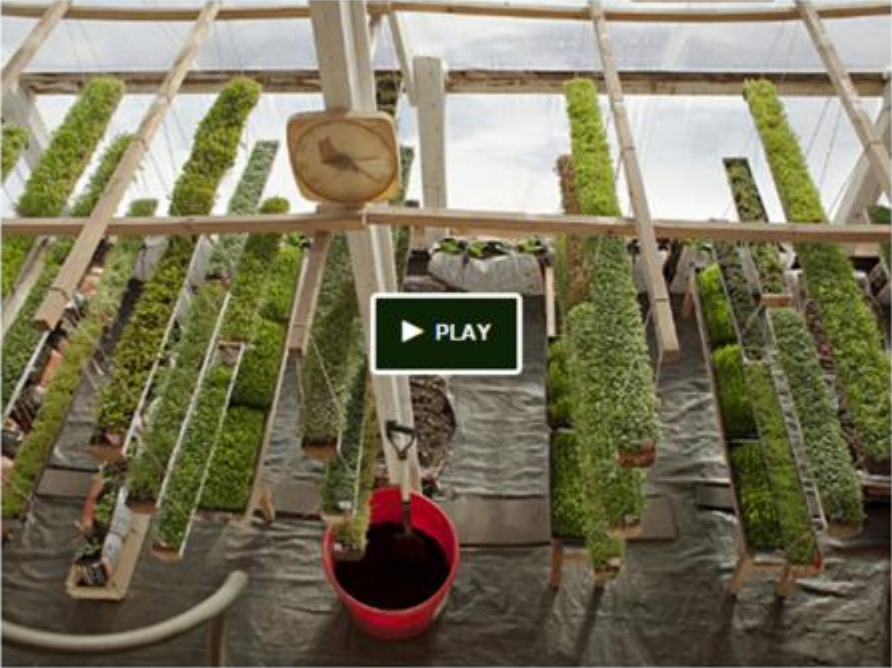
LIDA FARM PROJECT: COSTS

| | <i>Greenhse</i> | <i>Root cellar</i> | <i>Cabin</i> |
|------------------|------------------------|------------------------|-----------------------|
| Apprentice Cabin | | | \$3,242 |
| Excavating | \$ 1,841 | \$ 789 | \$ - |
| Labor | \$ 1,330 | \$ 570 | \$ - |
| Plumbing | \$ 1,837 | \$ - | \$ - |
| Materials | \$ 4,273 | \$ 649 | |
| Lumber | \$ 7,589 | \$ 2,710 | \$ 542 |
| Solar | \$ 7,057 | \$ - | \$ - |
| | <u>\$23,928</u> | <u>\$ 4,719</u> | <u>\$3,785</u> |
| | <u>74%</u> | <u>15%</u> | <u>12%</u> |

LIDA FARM PROJECT: FINANCING

Lida Farm Deep Winter Greenhouse and Root Cellar Project

by Ryan Pesch



74
backers

\$8,242
pledged of \$5,000 goal

0
seconds to go


Funded!

This project was successfully funded on September 25.

This deep winter greenhouse/root cellar project extends our growing year round to overcome terrible weather and bad food in Northern MN

📍 Pelican Rapids, MN 🌱 Farms [Share this project](#)

Ryan Pesch
🕒 First created | 3 backed
🌐 lidafarm.com
[See full bio](#) [Contact me](#)



CONSTRUCTION: LESSONS LEARNED

- Skip the hillside
- Be prepared to shovel
- ICF blocks recommended
- Spray foam

PRODUCTION











Reality Greenhouse at Paradox Farm



Reality Greenhouse at Paradox
Farm



Cress

Reality Greenhouse at Paradox
Farm

Win-Win Choi



Reality Greenhouse at Paradox Farm



A large, rectangular white tray filled with rows of dense, dark green Tatsoi plants. The plants have rounded, slightly crinkled leaves. The tray is sitting on a wooden surface. In the background, other trays with different types of plants are visible, and a chain is hanging on the left. A wooden cutting board with a red-handled knife is in the bottom left corner.

Tatsoi

Reality Greenhouse at Paradox
Farm



Red Giant Mustard

Reality Greenhouse at Paradox Farm



Minuet Chinese Cabbage

Reality Greenhouse at Paradox
Farm

A close-up photograph of Bulls Blood Beet leaves. The leaves are a deep, vibrant red color with prominent, lighter red veins. They have a slightly serrated or wavy edge and a glossy texture. The leaves are densely packed together, filling most of the frame. In the background, some green foliage and a wooden structure are visible but out of focus.

Bulls Blood Beet

Reality Greenhouse at Paradox
Farm



Red Russian kale

Reality Greenhouse at Paradox
Farm



Ruby Streaks and Green Wave
Mustards

Reality Greenhouse at Paradox
Farm

A close-up photograph of a dense patch of Mizuna leafy greens. The leaves are bright green, elongated, and have a serrated or jagged edge. They are growing closely together, filling most of the frame. In the background, other plants and greenhouse structures are visible but out of focus.

Mizuna

Reality Greenhouse at Paradox
Farm



Mixed Lettuces

Reality Greenhouse at Paradox
Farm





Reality Greenhouse at Paradox
Farm



Black Gold Natural & Organic Potting

Reality Greenhouse at Paradox
Farm

A close-up photograph of a black plastic seedling tray filled with numerous pea shoots. The plants are densely packed, with their green stems and leaves visible above the dark brown soil. The leaves are small and rounded, typical of pea seedlings. The soil surface is uneven, with some small clumps and gaps between the plants.

Pea Shoots – The Gateway Green!

Reality Greenhouse at Paradox
Farm

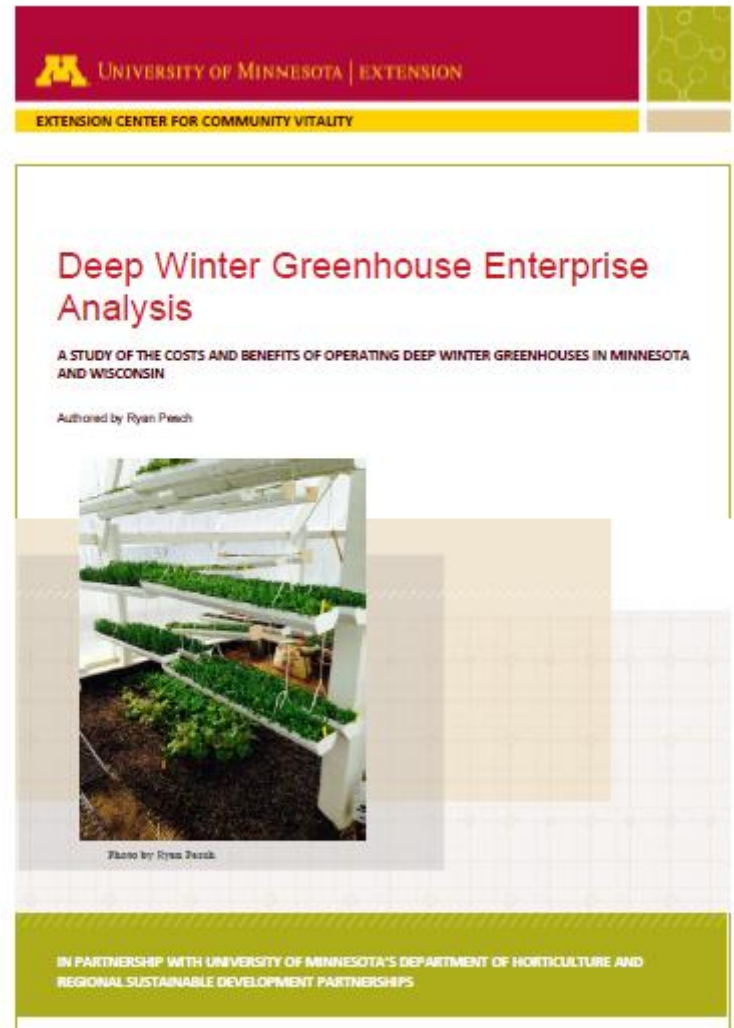
PRODUCTION ISSUES

- Moisture!!
- Timing



2015 ANALYSIS

- 2014 season
- 7 participants
- Find at
<http://www.extension.umn.edu/rsdp/statewide/deep-winter-greenhouse/>





REVENUES

| | <i>Range</i> | <i>Average</i> | <i>Median</i> |
|---|------------------|----------------|---------------|
| Gross Revenue | \$447-\$5,527 | \$2,609 | \$1,511 |
| CSA | \$488-\$5,527 | | |
| Direct Sales | \$1,025 | | |
| | | | |
| Operating Revenue | \$(527)-\$4,491 | \$1,717 | \$688 |
| Operating Revenue per Sq Ft of Growing Space | \$(1.88)-\$17.34 | \$6.96 | \$4.79 |
| Gross Margin | (118%) -81% | 34% | 57% |

DIRECT EXPENSES

| | Range | Average | Median |
|----------------------------------|---------------|---------|--------|
| Annual variable expenses* | \$443-\$1,166 | \$892 | \$974 |
| Seeds | \$40-\$240 | \$133 | \$120 |
| Propane | \$0-\$528 | \$298 | \$267 |
| Soil Mix | \$28-\$340 | \$199 | \$276 |
| Marketing costs | \$0-\$650 | \$146 | \$50 |
| Utilities | \$15-\$165 | \$92 | \$95 |

START-UP COSTS PER GREENHOUSE

| | <i>Range</i> | <i>Average</i> | <i>Median</i> |
|--|------------------|----------------|---------------|
| Start-up cost | \$5,797-\$73,035 | \$25,502 | \$20,578 |
| Cost per sq. ft. | \$20-\$172 | \$61 | \$47 |
| Cost per sq. ft. of growing space | \$38-\$345 | \$120 | \$90 |

- Greenhouses 1 and 5 were most profitable (highest net revenue and ROI)

ROI AND PAYBACK TIME

| | Grnhse1 | Grnhse2 | Grnhse3 | Grnhse4 | Grnhse5 | Grnhse6 | Grnhse7 | Overall** | |
|--|---------|---------|---------|---------|---------|---------|---------|-----------|--------|
| ROI (Net Revenue /Start-up Cost)* | 21.5% | 8.9% | -3.6% | 7.0% | 15.6% | -6.3% | -0.1% | 3% | |
| | | | | | | | | Average | Median |
| Payback Time to Recoup Investment | 4.0 | 8.4 | NA | 9.3 | 5.2 | NA | 28.4 | 11 | 8 |

* Low sales in Grnhse 6 and 7 and high capital costs in grnhse 3 explain negative ROI

RETURN TO LABOR

| | Grnhse1 | Grnhse2 | Grnhse3 | Grnhse4 | Grnhse5 | Grnhse6 | Grnhse7 | Average | Median |
|---------------------------|---------|---------|---------|---------|---------|----------|---------|---------|--------|
| Total hours worked | 630 | 111.5 | 205 | 127.5 | 233 | 97 | 167.3 | 224.5 | 167.3 |
| Hourly wage* | \$7.13 | \$6.17 | \$1.07 | \$20.24 | \$17.10 | \$(5.43) | \$3.48 | \$7.11 | \$6.17 |

* Operating revenue divided by hours

MARKET DOCUMENTATION

- Greens varieties have increased
- Opportunity for baby greens in winter
 - Microgreens are a thin market
- “Going” price in groceries for baby greens around \$10/lb
 - At a 40% margin, growers receiving \$6/lb

NOT IN THE MIX

- Household greens
- Summer transplants and cost decreases
- Sun-dried tomatoes / dried herbs
- Beautiful space

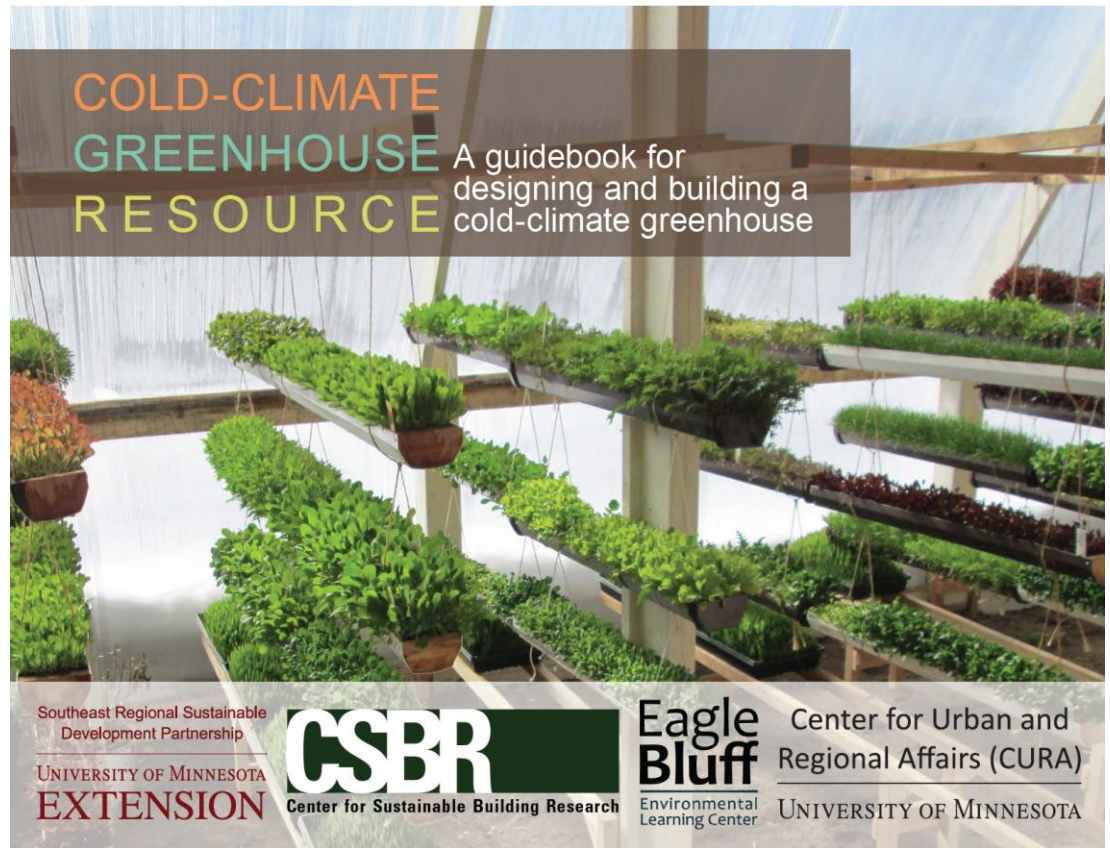
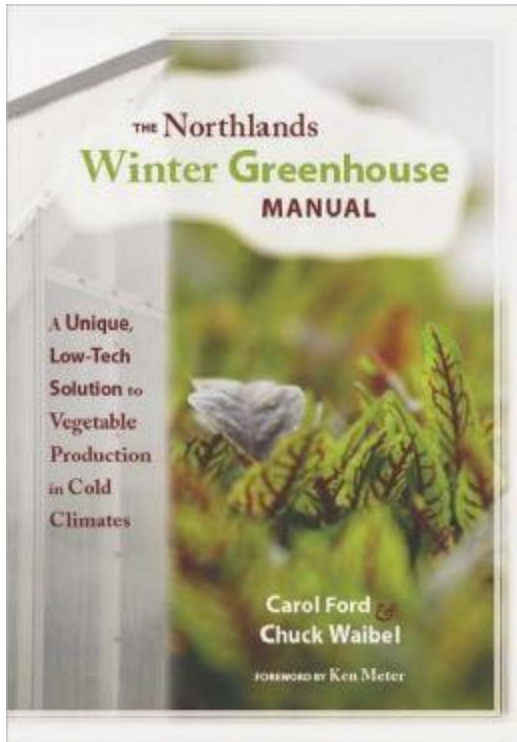
ECONOMICS

| | Fall CSA Shares | Winter CSA |
|-------------------------|---------------------------------------|--|
| Sales | \$1,000 (10 shares) | \$4,500 |
| Tools | Root Cellar, sheds, cooler | Root cellar, winter greenhouse |
| Marketing costs | Delivery (\$200 over 2 deliveries) | Delivery (\$400 over 7 deliveries w/dropsites) |
| Production costs | Not much | \$1,000 |
| Capital cost | Not much | \$900/year |
| Net return | About \$800 | About \$3,500 |
| Time | Packing + late season clean-up | Packing + clean-up + 1 hour daily through winter |

RECOMMENDATIONS

- Decide if DWG enterprise complements your goals and current production
- Should you go forward:
 - Maximize space
 - Consider Winter CSA
 - Keep start up costs low (under \$20k)

RESOURCES





Thanks,
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