

DevTreks –social budgeting that improves lives and livelihoods

Net Present Value Calculation 2

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Version: DevTreks 2.0.0

A. Capital Budget Net Present Value (NPV) Introduction

The introductory *Net Present Value 1* tutorial summarizes the main price adjustments, or discounting, used in NPV calculators. That reference explained the calculations associated with Operating Budgets. This reference explains the calculations for Capital Budgets (**1***). Discounting is identical in both budgets, but Operating Budgets only use an Input's operating and allocated overhead costs while Capital Budgets can contain all costs (**2***).

B. Data

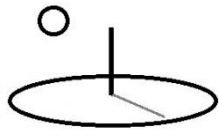
This reference uses irrigation capital data taken from the Kansas State Cooperative Extension Irrigation Capital Requirements reference. That reference documents the capital and energy costs for flood, center pivot, and subsurface drip, irrigation systems.

The NPV calculators demonstrated in this reference can be found at:

[https://www.devtreks.org/agtreks/preview/crops/linkedviewgroup/Net Present Value Calculators Group/5/none/](https://www.devtreks.org/agtreks/preview/crops/linkedviewgroup/Net%20Present%20Value%20Calculators%20Group/5/none/)

This capital budget data can be found at:

[https://www.devtreks.org/agtreks/select/crops/inputgroup/Irrigation, Sample Investment Analyses/2126771763/none/](https://www.devtreks.org/agtreks/select/crops/inputgroup/Irrigation,%20Sample%20Investment%20Analyses/2126771763/none/)



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<https://www.devtreks.org/agtreks/select/cropsconservation/componentgroup/IrrigationExamples/551/none/>

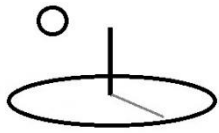
[https://www.devtreks.org/agtreks/preview/cropsconservation/investmentgroup/Capital Budgets, Irrigation Examples/275505672/none](https://www.devtreks.org/agtreks/preview/cropsconservation/investmentgroup/CapitalBudgets,IrrigationExamples/275505672/none)

These examples do not use Outputs or Outcomes, only costs are calculated. DevTreks discourages cost-only analysis. Benefits are just as important as costs and should be included in all analyses, even if the benefits must use nonmonetary indicators.

C. Inputs

a. Data Structure

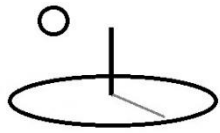
The following image demonstrates that 31 irrigation inputs are used to calculate input costs.



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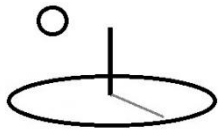
The screenshot shows a web browser window with the URL <https://www>. The application interface includes a top navigation bar with tabs for 'AgTreks', 'Search', 'Preview', and 'Select'. Below this is a secondary bar with 'Edit', 'Pack', 'Views', and 'Club'. A toolbar contains 'Preview' and 'Edit' buttons with left and right arrows. A row selector shows 'Row of 31' and a text input field with '0', flanked by 'Row' buttons with arrows. The main content area lists several items, each with a square icon, a title, and a date: 'Irrigation, Sample Investment Analyses', 'Connectors', 'Equipment Rental, Drip Installation', 'Filter', 'Filter Assembly', and 'Fittings, Miscellaneous Bulk'. Each item has a downward arrow button below it.

b. Calculations



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The only input requiring custom, or domain-specific, calculations is the irrigation pump. The *Capital Input* tutorial explains how these calculations work.



Irrigation, Sample Investm... X +

← <https://www.devtreks.org> Search »

Irrigation Power Calculat

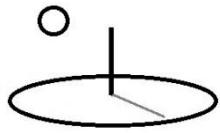
Media Mobile Desktop

Intro	1	2	3
4		Help	

Step 3 of 4. Calculate

Operating Costs

Total Engine Flywheel Power (hp) : 261.3866	Water Horsepower (hp) : 172.5152	Brake Horsepower (hp) : 261.3866
Actual Fuel Amount (per acre inch): 93.7500	Fuel Cost (per acre inch): 8.4375	Fuel Unit: kwh
Required Fuel Amount (per acre inch): 81.2364	Season Applied Amount (acre inches) : 28.7500	Water pumped (acre inches/hour) : 2.6667
Water Cost (per acre inch): 0.0000	Irrigation Labor Price (per hour): 8.00	Pumping Plant Performance: 86.6522
Irrigation Labor Cost (per acre inch): 0.3562	Irrigation Labor Amount (per acre): 0.0445	Pump Hours Needed per Season (per acre) : 10.7813
Equipment Labor Amount (per acre) : 0.0022	Lube Amount (gallons) : 0.0323	Water Price (per acre inch): 0.0000
Equipment Labor Cost (per acre inch): 0.0267	Repair Cost (per acre inch) : 0.2609	Irrigation Labor Amount (per acre): 0.0445
Lube Oil Cost (per acre inch) : 0.1294	Extra Energy (standby) Cost (per acre inch) : 0.0000	Equipment Labor Price (per hour): 12.00
Total Operating Cost (per acre inch) : 9.211	Capital Recovery Cost (per acre inch) : 1.6537	Equipment Labor Cost (per acre inch): 0.0267
Total Allocated Overhead Cost (per acre inch) : 1.691	Capital Cost: 12500.000	Lube Oil Cost (per acre inch) : 0.1294
Capital Unit: each		Extra Energy (standby) Cost (per acre inch) : 0.0000

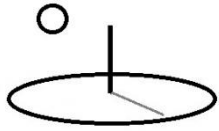


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D. Components

a. Data Structure

The following image demonstrates that 4 irrigation Components are used to calculate capital costs.



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AgTrek Search Preview Select

Edit Pack Views Club

Preview Edit

Irrigation Examples

Irrigation, Center Pivot

This example comes from OBrien, Dumle...

Irrigation, Flood

This example comes from OBrien, Dumle...

Irrigation, Pumping Plant

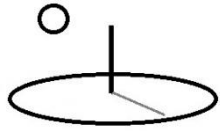
This example comes from OBrien, Dumle...

Irrigation, Subsurface Drip

This example comes from OBrien, Dumle...

Search IRIs:
<https://www.devtreks.org/agtreks/select/cropsconservation/componentgroup/Irrigation Examples/551/none>

b. Calculations

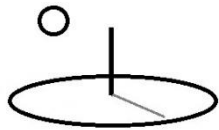


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A Net Present Value Component Calculator was run for each Component and produced the cost data shown in the following image. These costs summed each Input’s Capital Cost in their calculation.

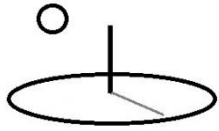
Why does the Annual Column include a negative Allocated Overhead Cost when the Inputs show zero Allocated Overhead Costs? Because a rule enforced in the NPV calculations documented in the introductory reference is to take discounted Salvage Value out of Allocated Overhead Costs and not Operating Costs or Capital Costs. The Component’s negative Allocated Overhead Cost reflects discounted salvage value. Operating Budgets treat all annual amortized costs as Allocated Overhead only (as do the full Capital Budget costs shown next), and may be a better approach.

At the time this rule was enforced, a requirement for NPV calculations in DevTreks was to match the Operating Budget calculations in the *Handbook*. This is an example of a calculation that a social network might not agree with. If not, the coordinator of a social network should send an email to a DevTreks administrator explaining the preferred calculations (i.e. same calculations in Operating and Capital Budgets). If the case is made, the next upgrade will include the social network’s recommendations. DevTreks is never perfect.



Component							
Date Applied	Label 1	Label 2	Amount	Eff. Life	Salv. Value	Incent. Amount	Incent. Rate
Irrigation, Center Pivot (4/12/2012 12:00:00 AM)							
12/31/2012	4.3.1	none	1	20	7000.0000	0.0000	0
Component Unit:each			ResourceWeight	0	Rates (R and N)		0.0100 0.0350
Description	This example comes from OBrien, Dumler and Rogers. Irrigation Capital Requirements and Energy Costs, Department of Agricultural Economics. Kansas State, 2011						
Total Costs - Component	Total Cost		Annual Cost		Interest Portion		
Total Operating Costs	0.00		0.00		0.00		
Total Allocated Overhead Costs	0.00		-317.91		0.00		
Total Capital Costs	73,646.73		4,081.16		1,827.83		
Total Costs - Component	73,646.73		3,763.25		1,827.83		
Total Costs - Component w. Incentives	73,646.73		3,763.25				
Inputs							
Input Name	Date Applied	Times	Incent. Amount	Incent. Rate			
Pipe, Underground, 8 inch							
	04/12/2012	1	0.0000	0			
Total Costs - Input	Amount	Unit	Price	Total	Interest	Total Cost	
Total Operating Costs	0	none	0.0000	0.00	0.00	0.00	
Total Allocated Overhead Costs	0	none	0.0000	0.00	0.00	0.00	
Total Capital Costs	1301	feet	3.9000	5,073.90	129.13	5,203.03	
Total Costs with Incentives						5,203.03	

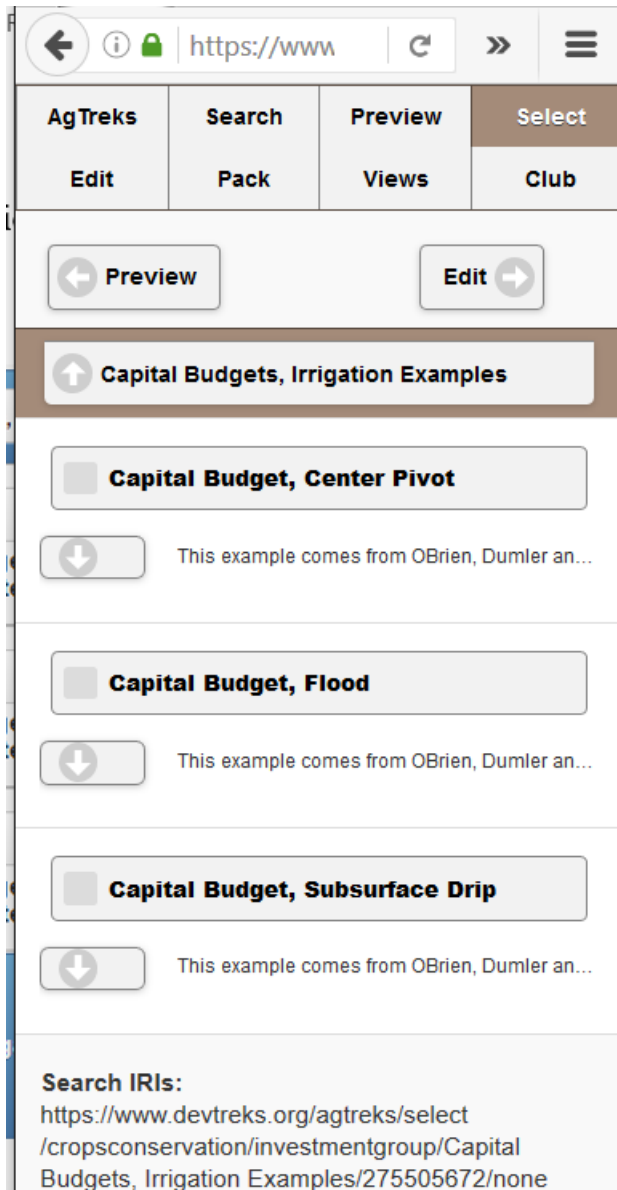
E. Capital Budgets



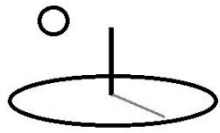
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a. Data Structure

The following image demonstrates that 3 irrigation Capital Budgets are used to calculate investment costs.



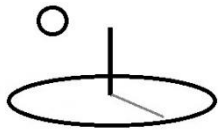
b. Calculations



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A Net Present Value Capital Budget Calculator was run for each investment and produced the cost data shown in the following image. DevTreks recommends that Capital Budgets also document the performance of investments by including Outcome and Output data.

The positive Operating Costs and Allocated Overhead Costs in the cash flow column result from the way the irrigation power calculations are run (see the Inputs section). Note the difference in how Components are calculated now. All annual amortized costs are treated as Allocated Overhead, not Capital and Allocated Overhead Costs. The responsibility of social networks is to recommend improvements and to ask the technologists supporting DevTreks to implement those recommendations.



Capital Budgets, Irrigation... X +

https://www.de Search >> ≡

Investment : Capital Budget, Center Pivot

+ Investment Details

Total Ben : 0.00	Ann Ben : 0.00
Total OC Cost : 264.81	Ann OC Cost : 0.00
Net OC Returns : -264.81	Ann Net OC Returns : 0.00
Total AOH Cost : 48.59	Ann AOH Cost : 6,350.20
Net AOH Returns : -313.40	Ann Net AOH Returns : -6,350.20
Total CAP Cost : 115,668.90	Ann CAP Cost : 0.00
Net Returns : -115,982.30	Ann Net Returns : -6,350.20
Incent Ben : 0.00	Ann Incent Ben : 0.00
Incent Cost : 115,982.29	Ann Incent Cost : 6,350.20
Net Incent Cost : -115,982.29	Net Ann Incent Return : -6,350.20
Equiv Ann Ann : -115982.29	

+ Time Period : Center Pivot, 2011

Investment : Capital Budget, Flood

+ Investment Details

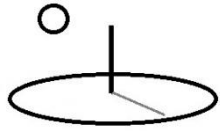
Total Ben : 0.00	Ann Ben : 0.00
Total OC Cost : 264.81	Ann OC Cost : 0.00
Net OC Returns : -264.81	Ann Net OC Returns : 0.00
Total AOH Cost : 48.59	Ann AOH Cost : 2,949.54
Net AOH Returns : -313.40	Ann Net AOH Returns : -2,949.54
Total CAP Cost : 48,975.00	Ann CAP Cost : 0.00
Net Returns : -49,288.40	Ann Net Returns : -2,949.54
Incent Ben : 0.00	Ann Incent Ben : 0.00
Incent Cost : 49,288.39	Ann Incent Cost : 2,949.54
Net Incent Cost : -49,288.39	Net Ann Incent Return : -2,949.54
Equiv Ann Ann : -49288.39	

+ Time Period : Flood Irrigation, 2011

Investment : Capital Budget, Subsurface Drip

+ Investment Details

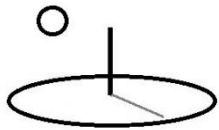
Total Ben : 0.00	Ann Ben : 0.00
Total OC Cost : 264.81	Ann OC Cost : 0.00



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F. Analyses

The *Benefit Cost Analysis 1* tutorial demonstrates how to aggregate and analyze net present value calculations. The following image shows that several analyses and a Story have been linked to this group of Capital Investments. As mentioned in several tutorials, base elements can be calculated and analyzed in thousands of ways. The Social Budgeting tutorial demonstrates how to develop a market for these services. In the long term, markets for data services can provide clubs with the incentives they need to build these tools.



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Browser address bar: <https://www>

AgTreks	Search	Preview	Select
Edit	Pack	Views	Club

← Search Views → Select →

← Edit Linked Views

Capital Budget Tutorials



Tech Story: Capital Budgeting Tutorial 1
This linked view introduces a six part video tutorial introducing the most basic capital budgeting that can be completed using DevTreks.
[view IRI](#)

Views → Select →

Machinery Capital Budget Analyzer Pack

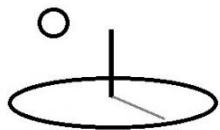
Dataset: Machinery Totals Analyzer
These analyzers analyze the fuel, repair, lube, labor, capital recovery, and thi costs for capital budgets that use machinery calculators for inputs and a net present value calculator for the budget. [view IRI](#)

Views → Select →

NPV Capital Budget Analyzer Pack

Dataset: NPV Aggregate Statistics
This analyzer generates adareate cost

Summary



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Capital investments are a basic requirement for modern society. They allow bridges to be built, factories to expand, sewers to remove wastes, and patients to be cured. This basic Capital Budgeting data may help people to improve their lives and livelihoods.

Footnotes

1. References in DevTreks also use the term *Investments* for Capital Budgets.
2. The *Life Cycle Calculator 1* reference demonstrates that Capital Budgets can include capital costs, allocated overhead costs, and operating costs. DevTreks leaves it up to networks to define the data standards and rules to be followed by clubs in their network. Those data standards should be documented in professional publications. The *Handbook* does not explicitly document calculations for Capital Investments, so other documentation, such as that found in the LCA tutorial, is needed.

References

O'Brien, Dumler, and Rogers. Irrigation Capital Requirements and Energy Costs. Farm Management Guide MF-836. Department of Agricultural Economics. Kansas State. 2011

References Note

We try to use references that are open access or that do not charge fees.

Improvements, Errors, and New Features

Please notify DevTreks (devtrekkers@gmail.com) if you find errors or can recommend improvements.

A video tutorial explaining this reference can be found at:

[https://www.devtreks.org/commonstreks/preview/commons/resourcepack/NPV Calculation 2, Capital Budgets/445/none/](https://www.devtreks.org/commonstreks/preview/commons/resourcepack/NPV%20Calculation%20Capital%20Budgets/445/none/)